

Using Innovative Technologies for Measurement, Monitoring and Sustainable Management of Urban Crowns and Canopy



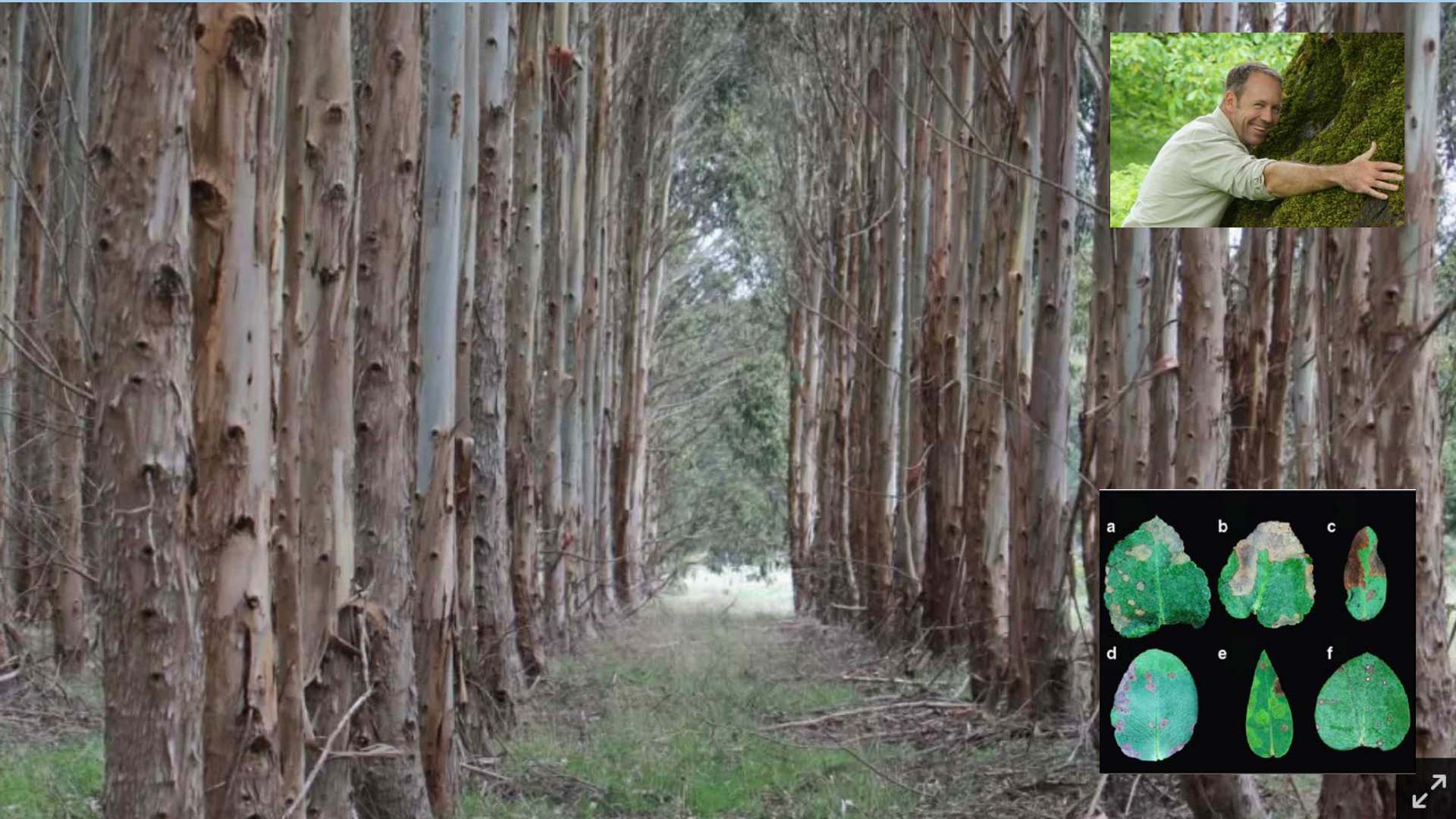
Arboriculture Association | 09 September 2019

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A forest pathologist? What's that?



Source: SMH

Tuart Decline – *Eucalyptus gomphocephala*



Source: wanowandthen.com



© 2007 Europa Technologies
Image © 2007 TerraMetrics
Image NASA

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Urban Sprawl



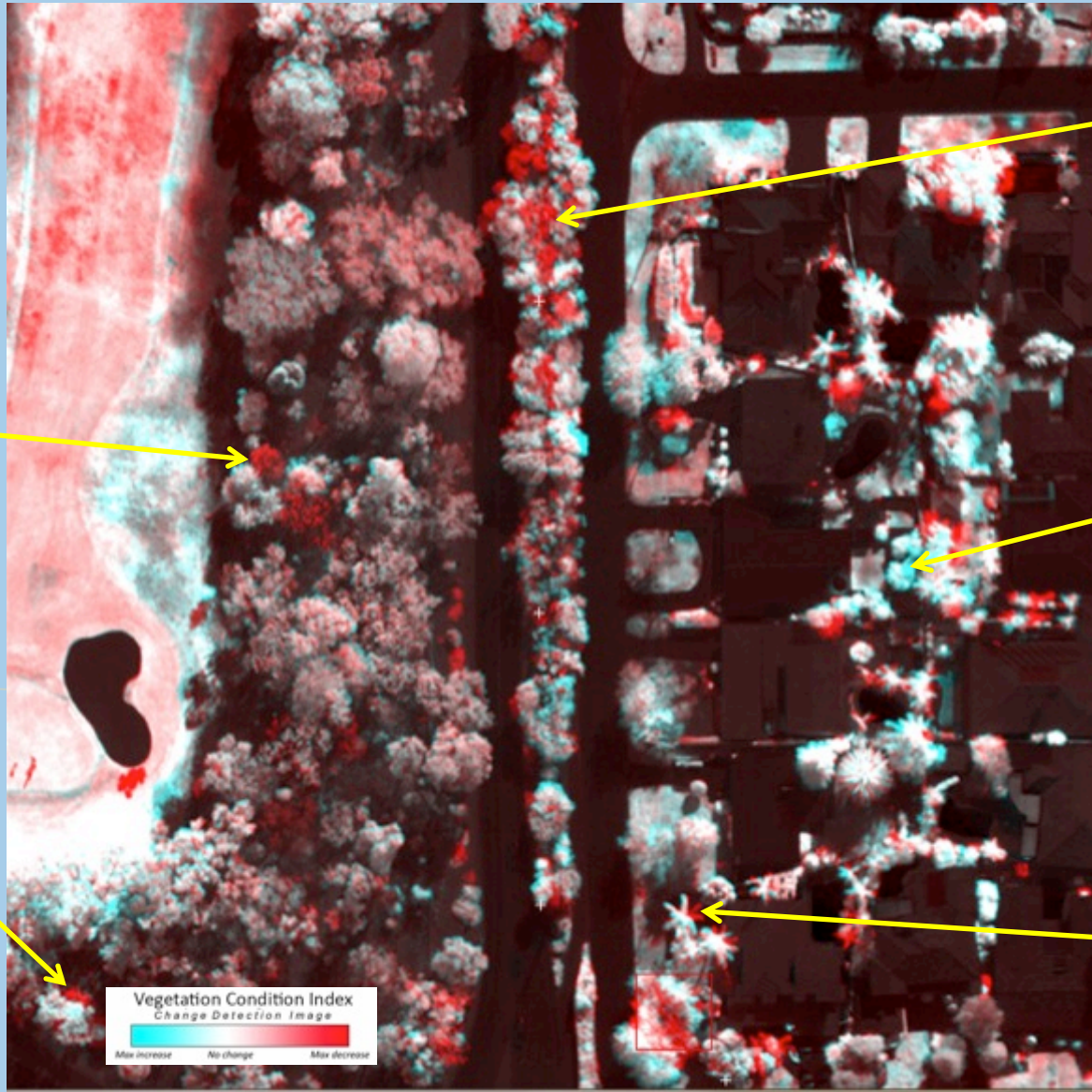
Population in **cities** to grow to around **2.5 billion** people by 2050

Number of **extreme weather events** and **temperatures** in cities to grow

Increasing **trade**, bringing new **pests** and **diseases**

The **livability** of cities depends on **greenspace & canopy**

Early detection of vegetation health disorders



Powerline clearance pruning

Healthy growth

Palm fronds pruned

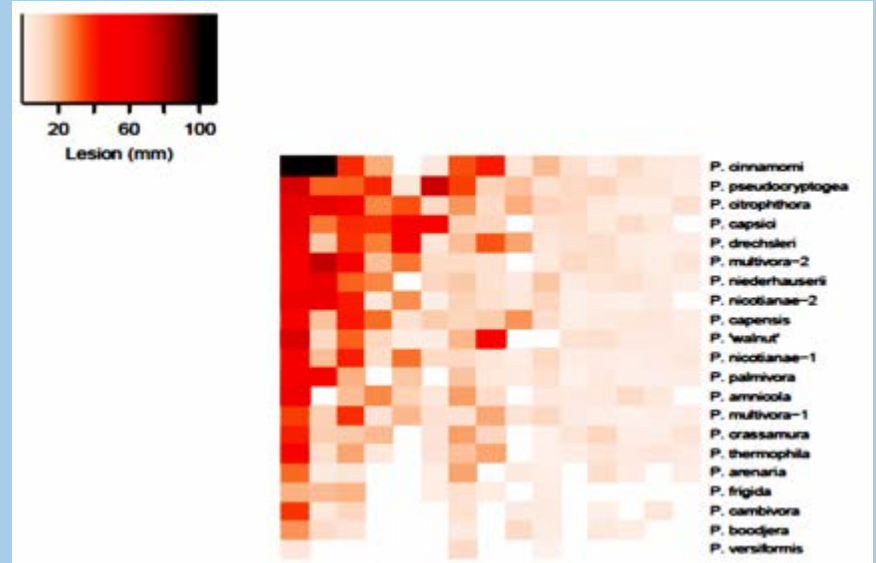
Sudden death Shrub

Branch collapse



Accurate and consistent measure annual change in vegetation health

A good start in life...



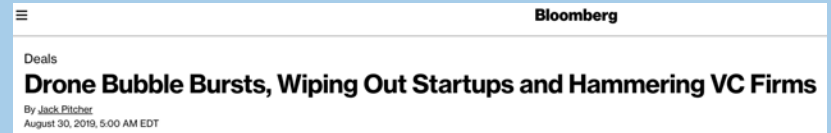
Source: Dr Mohammed Khdiar

- 60 of 79 sites with at least one Phytophthora
- One site 71 detections of 22 species
- Five sites more than 15 Phytophthora spp.
- **Diversity in urban area is high**

Scott et al. 2009 *Persoonia* 22: 1-13

Barber et al. 2013 *UFUG* 12: 569-575

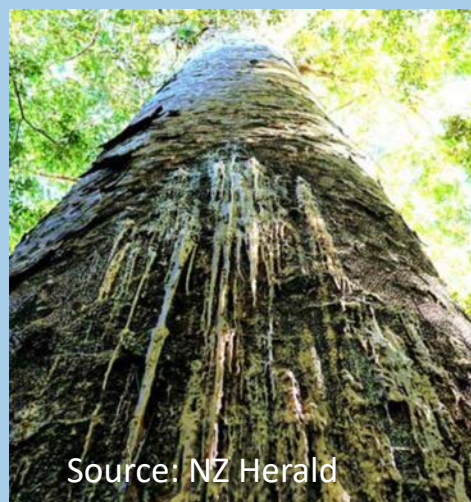
Cubesats/Drones/UAVs/Hyperspectral/AI/ML.....



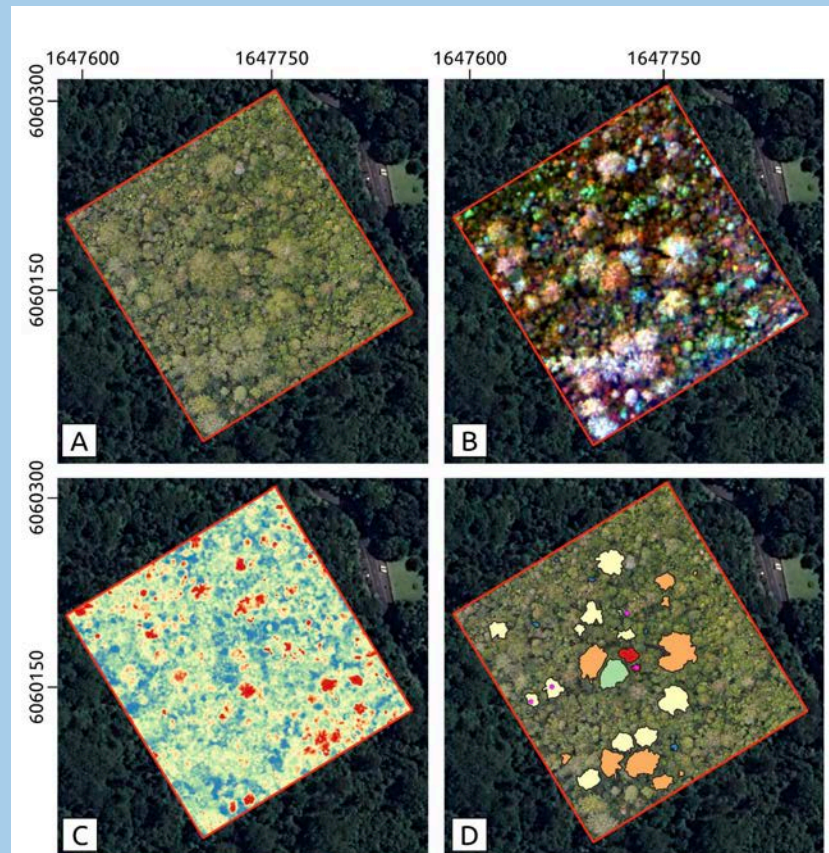
Venture capitalists poured \$2.6 billion into drones from the beginning of 2012 to June 2019.

Startups founded during 'peak hype' in the commercial drone industry ran out of money before they could generate profit

Kauri Dieback in New Zealand



Source: NZ Herald



What data are you relying on to set cover KPIs?

THE GREEN KEY

In technical terms, a tree is a plant over six metres, while a shrub is under six metres. However, for an accurate comparison to our previous mapping report, "Where are all the trees?", we have used the following definitions:



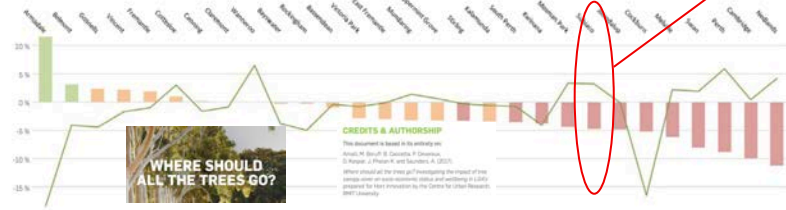
Trees
Anything that looks like a tree from above, distinguished from shrubs by the shadows cast.



Shrub
Landscaped vegetation as well as bushland shrubs, crops and grapevines.

KEY STATISTICS	2009*	2016	
Tree Canopy Cover	22.27%	19.95%	2.32% Loss
Shrub Cover	8.73%	7.63%	1.1% Loss
Grass Cover	29.87%	31.19%	1.32% Gain
Hard Surface	39.13%	41.22%	2.09% Increase

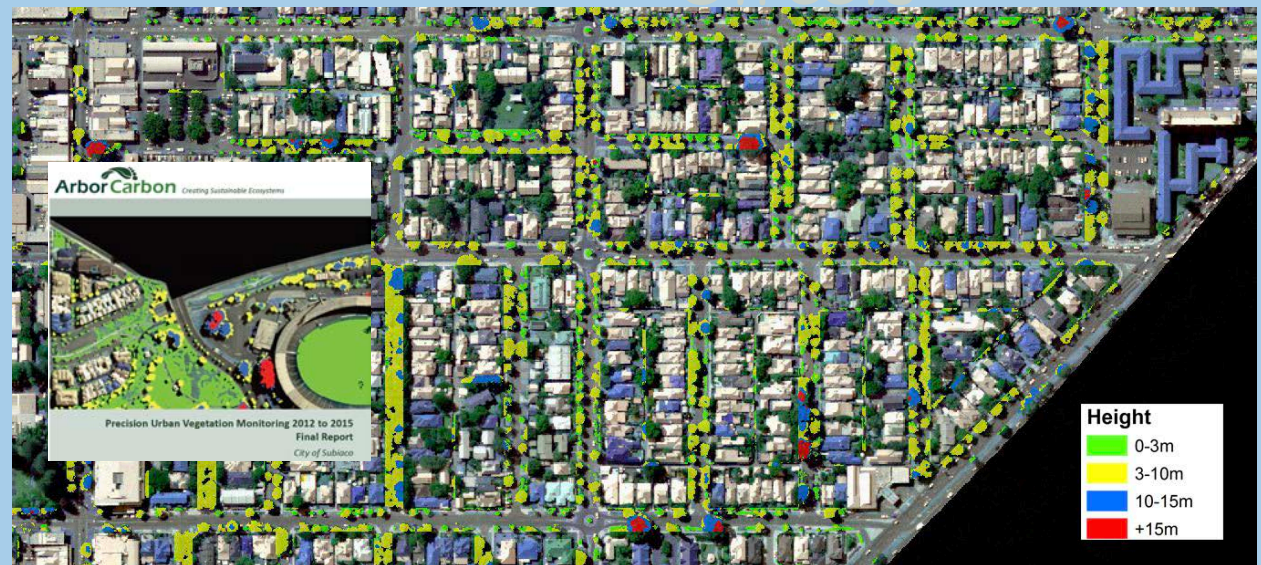
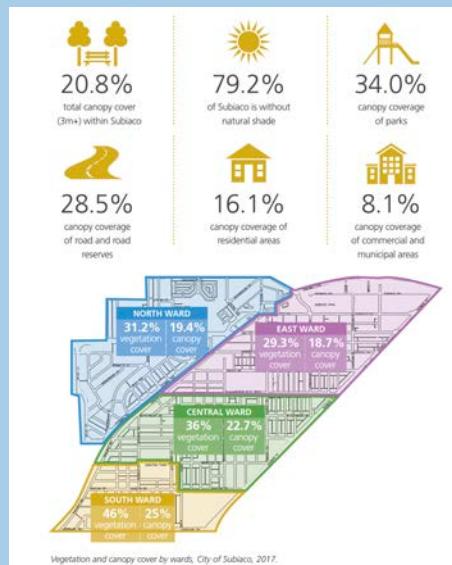
SHRUB & TREE CANOPY COVER CHANGES IN WA LGAs 2011-2016



A decrease in canopy cover in Subiaco of almost 5%??

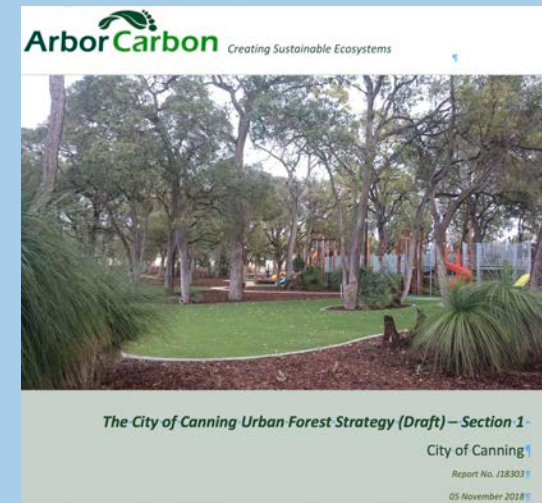
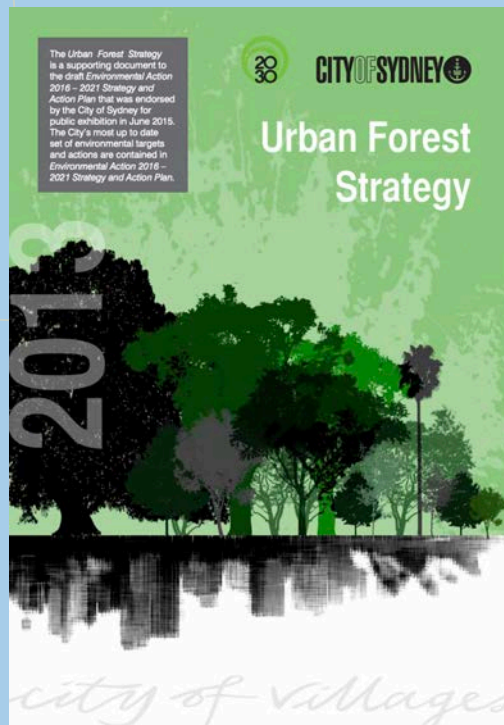
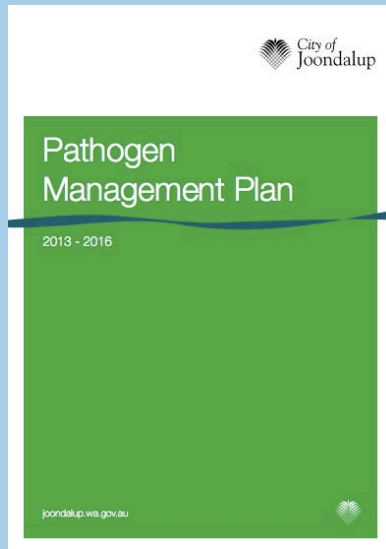
See Parmehr et al. 2016 UFUG for limitations of i-tree

Streets

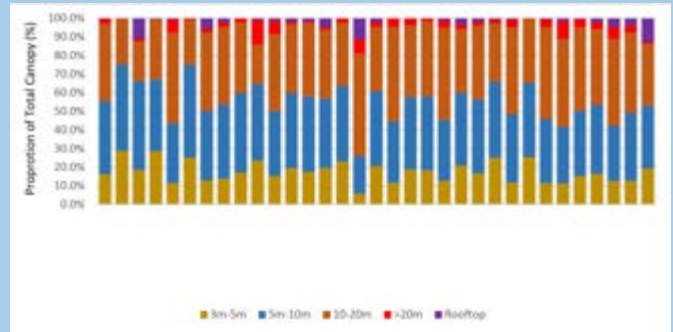
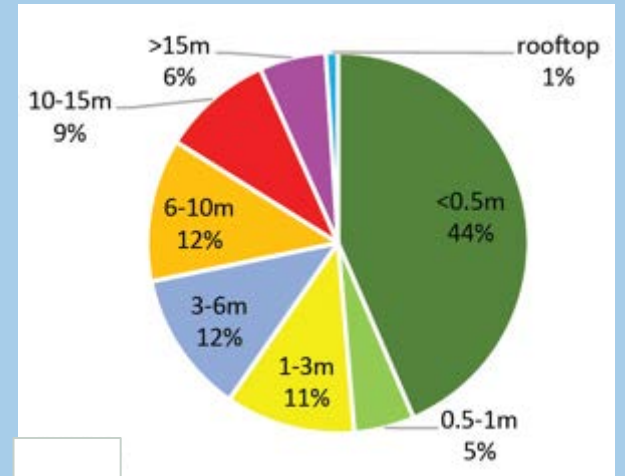
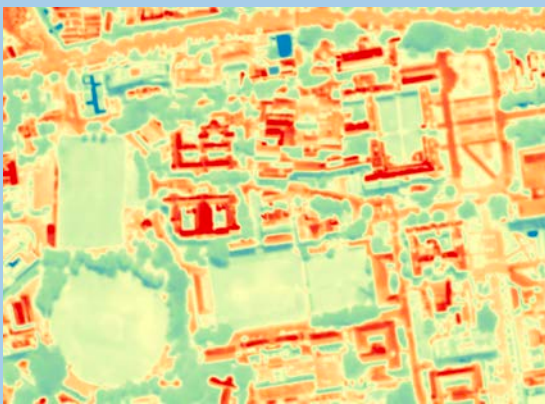
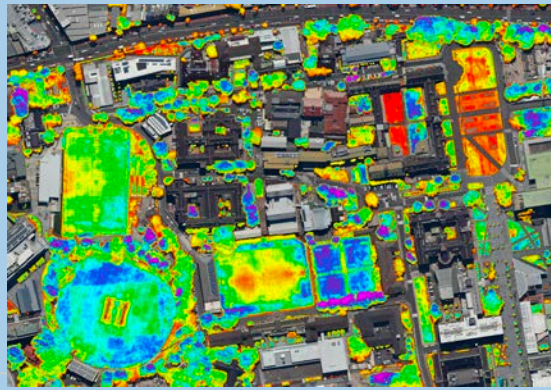
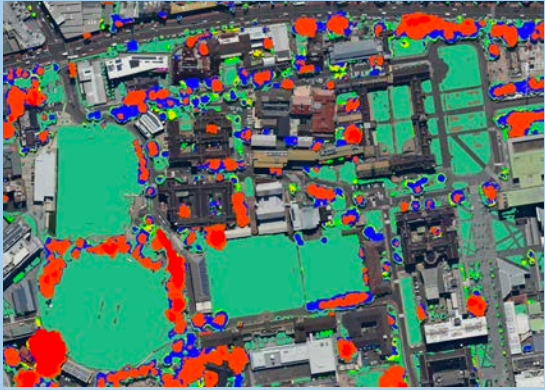
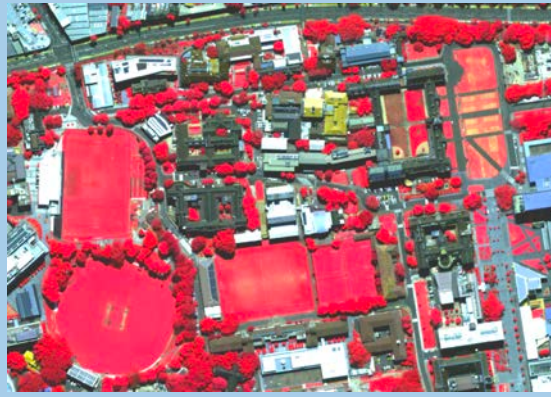


A marginal increase in canopy cover has been achieved since 2012 which appears to be as a result of an increase in canopy in residential areas and in the road reserve (City of Subiaco Draft Urban Forest Strategy 2018).

Data for Plans, Strategies, Local Strategic Planning Statements

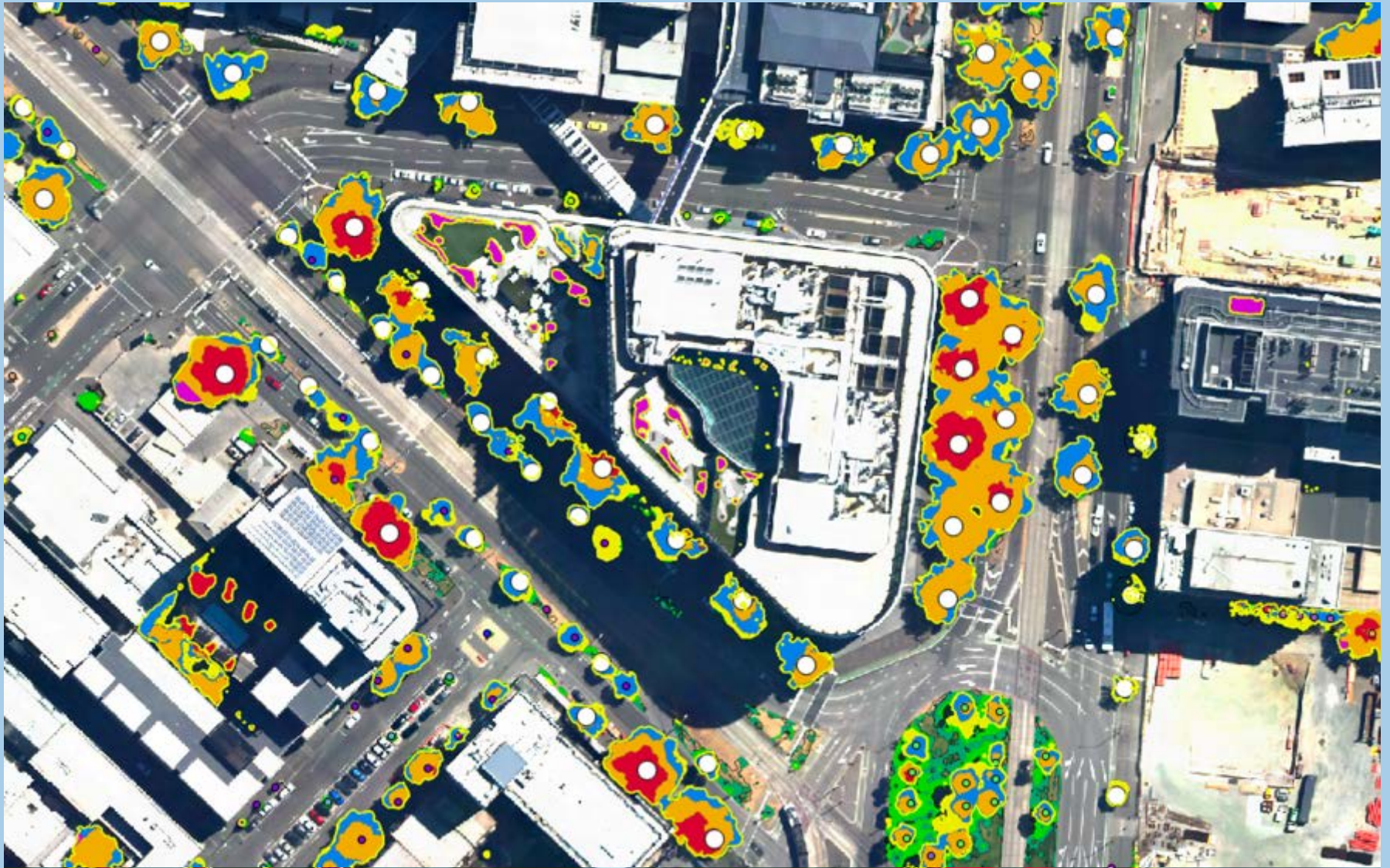


Forests



1000s of hectares per day at high altitude from manned aircraft

New technologies – ArborCam – Baseline Cover

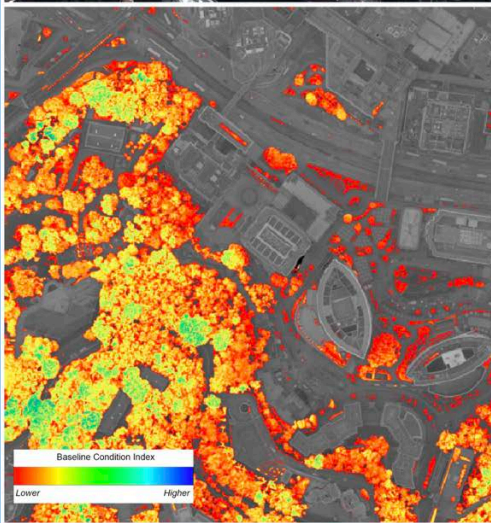
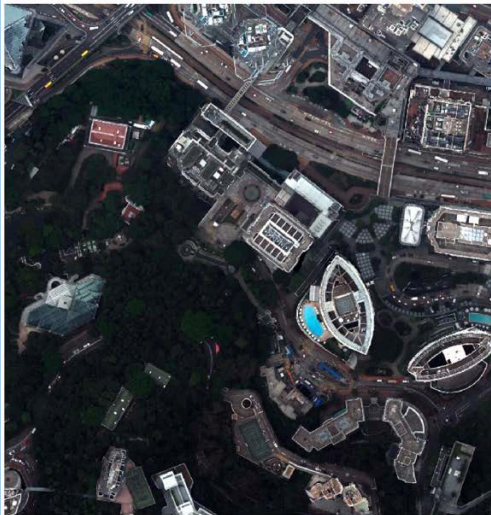


Early Detection of Disease & Mitigation of Risk

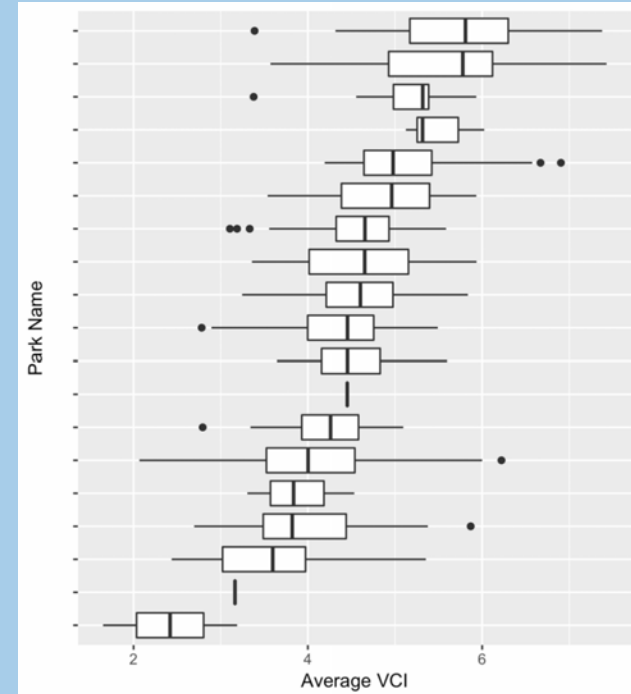
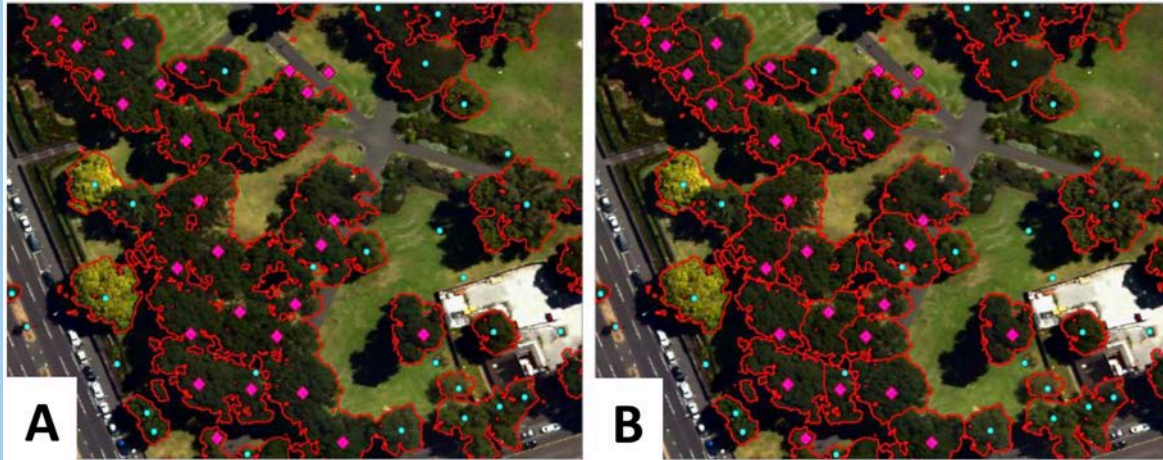
Tree management in Hong Kong under fire after falling branch kills Indonesian domestic helper

Civic Party lawmaker Tanya Chan said she had seen 'no real action taken by the government' despite seven years of pressing

PUBLISHED: Tuesday, 21 August 2018, 9:54am
UPDATED: Saturday, 08 September 2018, 5:26pm



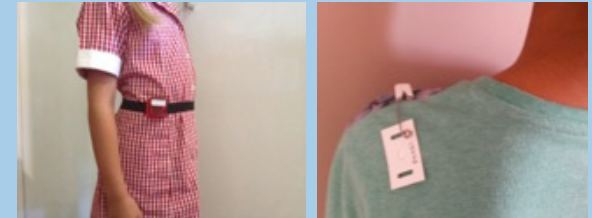
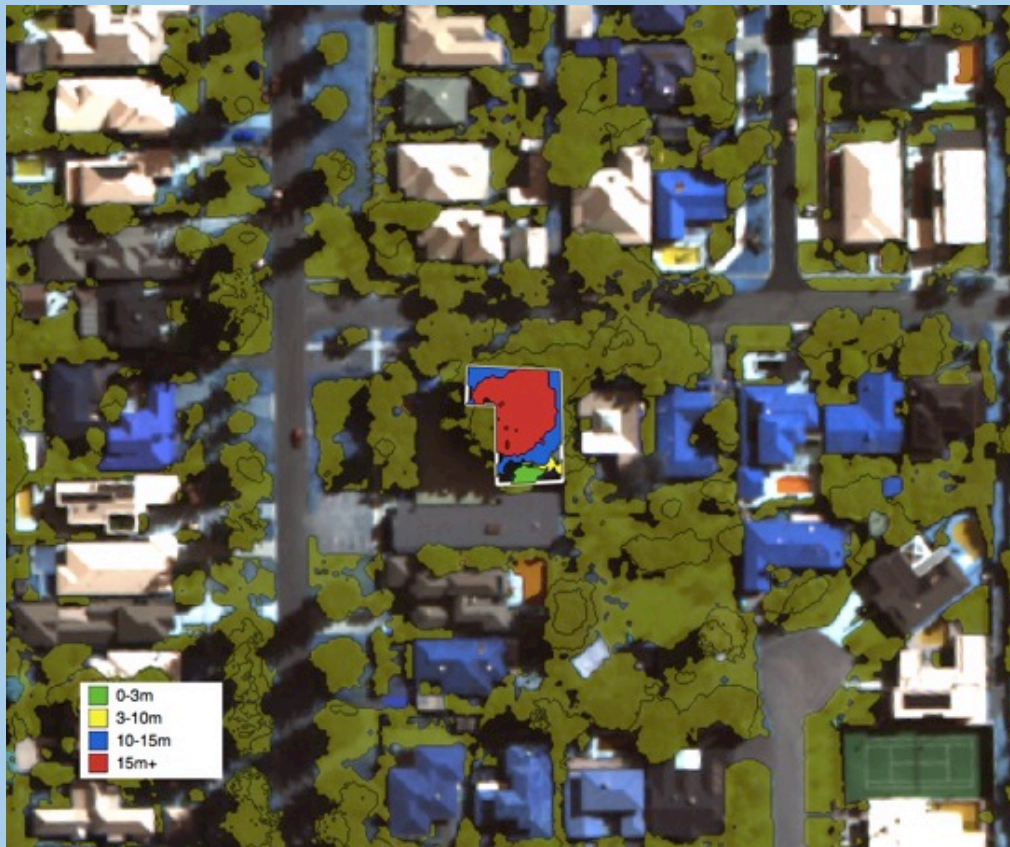
Forests



Quantitative measure of tree condition of all trees – public and private

Urban canopy and human health

- The data proves what we already suspect..
- Less canopy = **hotter temperatures, more exposure to UV, less physical activity**



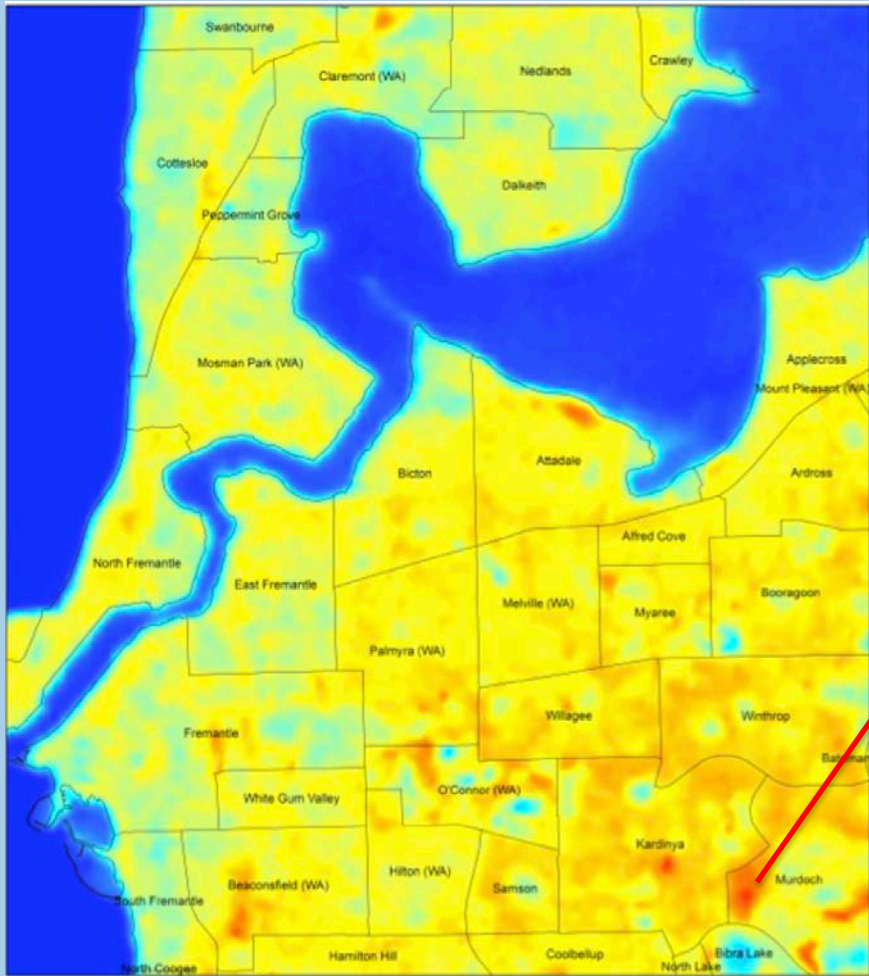
Physical Activity UV Exposure

The **largest global study** to examine physical activity in children aged between two and five years old

66% children not getting the nationally recommended three hours of daily physical activity needed for their growth and development. ...trees, shrubs and edible gardens are important for active play

Christian et al. 2019 Int. J. of Public Health
<https://doi.org/10.1007/s00038-019-01289-y>

Urban canopy and human health...our lives depend on it



Land Surface Temperature (deg C)



Land Surface Temperature
Mid morning 10 January 2014



Take Home Messages

- **Population within global cities will increase to around 2.5 billion people by 2050**
- **Frequency of extreme weather events and temperatures in cities will increase**
- **Remote Sensing is a complementary tool for the precise measurement and management of urban canopy**
- **Very important to select the right platforms and sensors for the task**
- **You can't manage sustainably without accurate data**
- **Urban Planners, Landscape Architects, Urban Foresters, Arboriculturists....and even Forest Pathologists have a great responsibility**

Thank you for your attention!

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