NURSERY PAPERS

FEBRUARY 2018

WHERE SHOULD ALL THE TREES GO?

The nursery industry has a goal of 20 per cent tree canopy cover for Australia's urban environments by 2020. To help achieve this, being able to measure the amount of canopy cover that currently exists and the best ways to manage and increase it is an important tool.

The 2014 report *Where are all the trees?* created Australia's first national baseline measurement of tree canopy cover in 139 local government areas (LGAs).

This Nursery Paper explores a follow-up project *Where should all the trees go? Investigating the impact of tree canopy cover on socioeconomic status and wellbeing in LGA's* (NY16005), which aimed to correlate the amount of tree cover with social, economic and health outcomes for urban residents.

Summary

The project's objective was to inform and identify priority areas for greening. Its central question was: How can local government greening efforts be most effective in addressing differences in metropolitan residents' social, economic and health outcomes and vulnerabilities, their exposure to high temperatures and access to green areas?

In other words, where should all the trees go?

Researchers answered this question by updating the 2014 estimated canopy cover of 139 metropolitan LGAs using the i-Tree sampling method. The team examined the relationships between canopy cover and indices of socio-economic disadvantage (SEIFA), population under five years and over 65 years living alone, non-communicable disease health data from the Australian Health Survey (2011-12), and a calculation of heat island intensity derived from satellite imagery for summer 2015-2016.

Using this data, the team developed the VHHEDA (Vulnerability to Heat, poor Health, Economic Disadvantage and Access to green spaces) index.

BACKGROUND

The development of a systematic method of assessing green land cover, aided by freely available satellite imagery, has led to growing government interest around the world in the extent and loss of urban canopy cover. The i-Tree suite of tools has contributed to this trend and is one of the most robust and cost-effective methods of measuring and monitoring urban greening.

To answer the question 'Where should all the trees go?', researchers developed and analysed a variety of geographic data layers, aiming to understand the rates of vegetation change in LGAs across major metropolitan regions, as well as the areas of abnormally high heat, socio-economic disadvantage and potential health concerns.

For these LGAs, urban greenness has become an increasingly important consideration for strategic planning and enhanced liveability. However, they vary in their engagement in providing information about urban green cover and co-ordinating action. The results in this report show that liveability in terms of access to greenspace and concentration of heat is spread unevenly, in addition to an uneven spread of economic and health circumstances.

Many metropolitan LGAs also contain national parks which display natural fluctuations in vegetation cover. Trees and shrubs are subject to dieback and leave opportunities for new vegetation growth (either shrub or tree depending on the circumstance). Bushfire and drought can also reduce tree canopy cover but allow shrubs or juvenile trees to take their place.

Conclusions drawn from the data need to consider exchanges between land-cover classes and should note that a range of factors influence changes in cover.

Nursery & Garden Industry Australia

This communication has been funded by Hort Innovation using the nursery research and development levy and contributions from the Australian Government.

Hort Innovation Strategic levy investment | NURSERY FUND

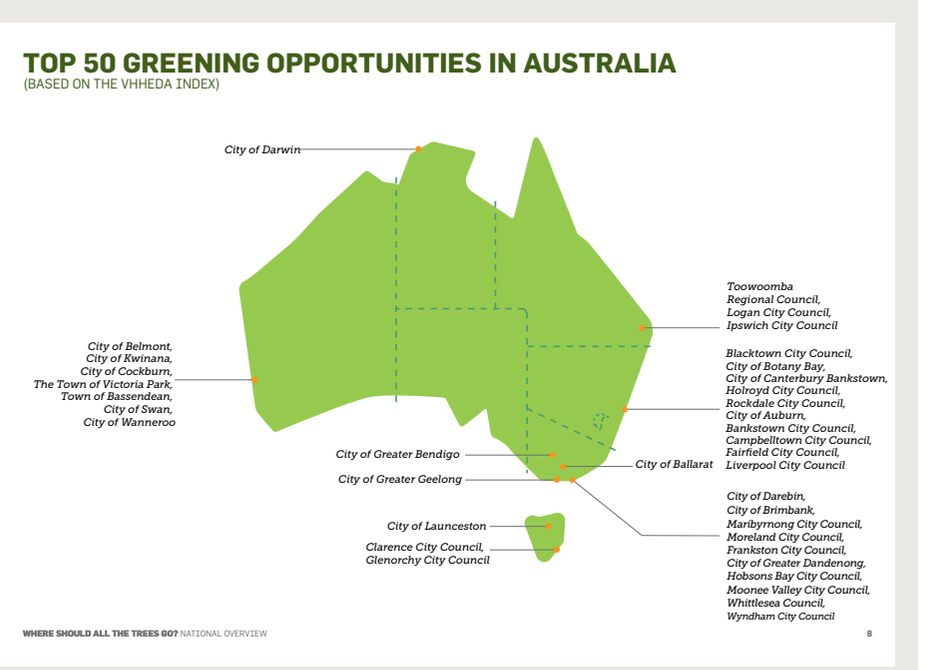
THE RESEARCH

RMIT University carried out the research work using ultra-high resolution aerial PhotoMaps™ of 139 LGAs from Nearmap, taken from a satellite in a single month across the entire country. Nearmap is a fee-for-service provider of aerially captured photographs at a generally higher resolution over urban areas than Google Earth Images.

Images of 1000 random points were selected in each of the LGAs, and each one classed on whether it showed grass and shrubs, trees, or hard surfaces such as roads, buildings and carparks. Each council area was compared with the previous measure of tree cover, in an effort to see if urban greening is happening faster than development.

The project team worked with the University of Western Australia and the Data 61 Unit of CSIRO to gather health and socio-economic data for each LGA, and map temperatures to get an idea of the 'heat island' effect.

i-Tree was selected as the most robust and cost-effective method to be used for identifying changes in canopy cover and other land uses. The majority of LGAs were measured during leaf-on conditions to allow for full canopy identification.



Differences in timing and periods of socio-economic and health data and greening data were a key limitation. i-Tree based land-cover information was from 2015 and 2016 while socio-economic and health data were based on the 2011 ABS Census. In addition, i-Tree data was only produced at the LGA level, while socio-economic and health information is available at the sub-LGA level. These spatial area differences affected the strength and significance of the statistical relationships.

KEY FINDINGS

Over the three to eight-year period since the previous study, rates of greening in Australian cities were anticipated to be stable. However, this project found that greening has decreased by 2.6 percent. Further work is required to understand why this change is occurring. This line of enquiry will be followed firstly through communication with LGAs and the work of the 202020 Vision team and later through further research. While it is known that the Australian backyard is disappearing (e.g. Hall, 2010[1]; Daniel et al. 2016[2]) much more research is required to understand the factors influencing this unanticipated trend.

The project developed the VHHEDA index, which is the first of its kind to identify which areas of socio-economic and health disadvantage also coincide with a lack of green cover and a high incidence of heat.

This project's results display two consistent trends for tree canopy cover and total vegetation change: significant canopy cover loss during the five years (2009 to 2016), which is offset by gains in shrub cover (or saplings) during the same period. This represents a natural interchange between the canopy class and shrubs.

Local government areas which have lost green cover have no clear spatial pattern. The largest decreases are not concentrated in either peri-urban or inner-city areas but occur differentially across all States and in a variety of different LGA locations. This green cover loss results from a variety of processes that include bushfire mitigation policies, such as the 10/50 rule in NSW; subdivision of large suburban blocks and the disappearance of the backyard; consumer trends in housing towards smaller gardens; and greenfield development on the edge of urban areas.

1 Hall, T (2010) *The Life and Death of the Australian Backyard*, CSIRO.

2 Daniel, C., Morrison, T.H. & Phinn, S., 2016. The governance of private residential land in cities and spatial effects on tree cover. Environmental Science & Policy, 62, pp.79–89.

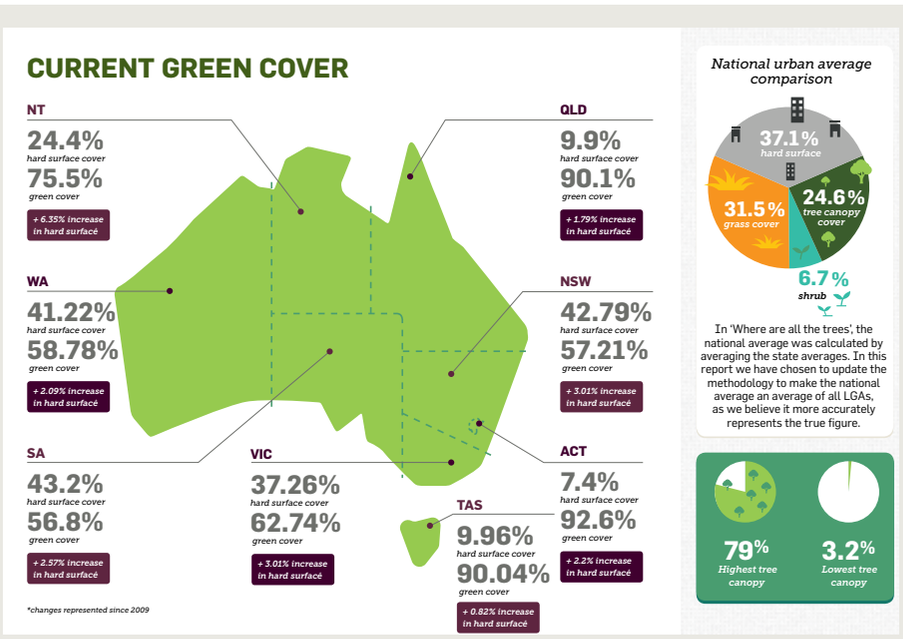
The data also provides the opportunity for a research project to analyse heat sources and types of greening which could be used to alleviate it. The project shows it is possible to establish a benchmark of urban heat island for Australian cities.

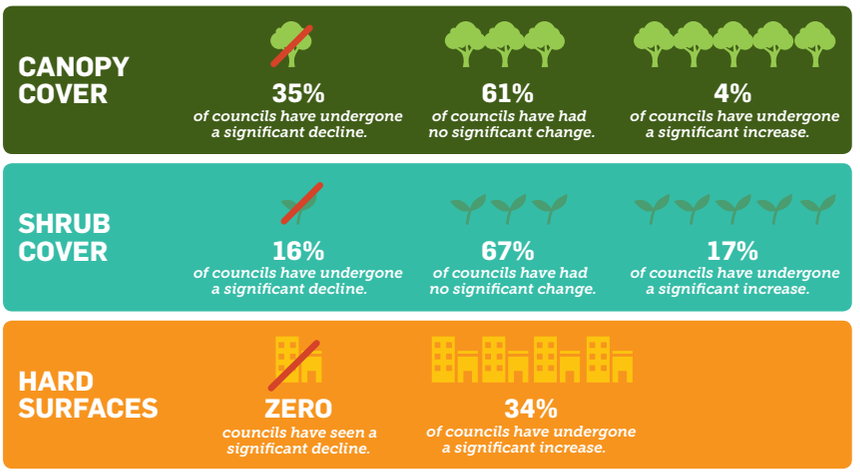
It also confirms the already dominant place of i-Tree as a methodology for monitoring urban green spaces, and increases understanding of its benefits and drawbacks. While i-Tree is robust, relatively cost-effective and can be improved by more accurate and timely imagery, the costs rapidly escalate at the sub-LGA level. This makes it unfeasible for national benchmarking at this scale.

Since there is a natural interchange between shrub and tree canopy cover, reporting on the growth in one without considering the other should be treated with particular caution. For example, if tree canopy is used as a benchmarking for greening or urban environmental performance, this should not be done without considering the shrub layer.

NEXT STEPS

1. The project includes a series of detailed maps and graphs that can be used to encourage and interest LGAs to devote more resources towards greening.
2. The outcomes could be used to model a strategic metro-wide planning process that State governments could use as part of their own planning process.
3. The project allows for the development of a series of scorecards that will be introduced to individual LGAs to highlight areas for improvement.
4. Increased understanding of the relationships between socio-economic indicators and the presence or absence of urban vegetation.
5. Interpretation of the link between the prevalence of urban hotspots and the percentage canopy cover.





IMPLICATIONS FOR THE NURSERY INDUSTRY

By measuring current tree cover and researching its impact on temperature and the health of the population, this project aimed to build support for the increase of canopy cover in urban areas.

It highlights the vulnerability of different communities with a lack of canopy cover to heat stress, poor health, and reduced socio-economic circumstances, and prompts the question: how much potential greening area is there to effectively mitigate Australia's metropolitan hot spots?

Large areas of railway land, roofs and major highways could be important locations for reducing urban heat. The data generated will assist in identifying locations for increased consumption of green life products by governments, businesses, schools and consumers. The work is targeted at horticulture industry levy payers and industry stakeholders involved in the 202020 Vision.

The project *Where should all the trees go? An investigation of the impact of tree canopy cover on socio-economic status and wellbeing in LGAs* (NY16005) is a strategic levy investment under the Hort Innovation Nursery Fund.

This project has been funded by Hort Innovation, using the nursery research and development levy, co-investment from RMIT University, CSIRO Data 61, University of Western Australia and contributions from the Australian Government.

LINKS TO RESOURCES

http://202020vision.com.au/help-hub/wsattg/

Where should all the trees go? An analysis of urban tree canopy cover in Australia

Investigating the impact of tree canopy cover on socio- economic status and wellbeing in LGA's

Marco Amati, Bryan Boruff, Peter Caccetta, Drew Devereux, Joe Kaspar, Kath Phelan and Alex Saunders

RMIT University

With: CSIRO Data 61, University of Western Australia

Project number: NY16005

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