At home among the gum trees?

New Ways of thinking about Perth's urban forest

Clean Air and Urban Landscapes Hub

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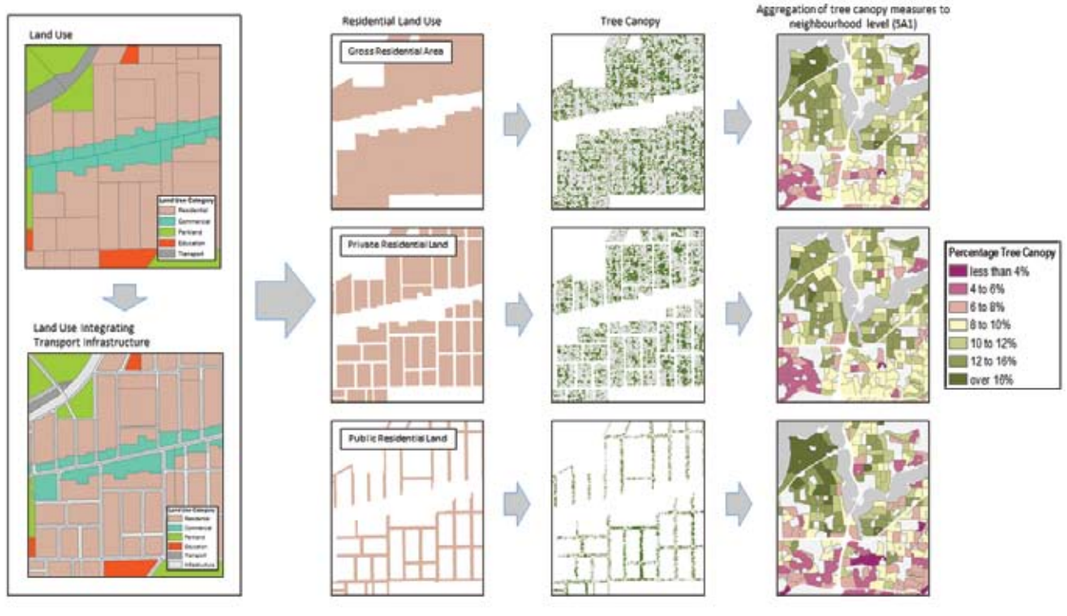
Urban vegetation contributes to a range of ecosystem services including the enhancement of health and wellbeing, amelioration of urban heat islands, filtration of storm water and air pollution, and the provision of habitat for species diversity. Urban vegetation also generates economic benefits through reduced energy costs for heating and cooling, and increases property values in our green leafy suburbs.

In Perth, the move towards an increasingly compact, dense urban form is putting the squeeze on space for urban vegetation, particularly large trees. Researchers within the Clean Air and Urban Landscape Hub (nespurban.edu.au – funded under the Australian Government's National Environmental Science Program) have used high resolution digital aerial imagery to identify the factors driving tree canopy cover in Perth's residential neighbourhoods.

Our research team, including Joe Hurley, Marco Amati and Kath Phelan at RMIT, Peter Caccetta and Joanne Chia at CSIRO, and John Duncan at UWA, mapped urban tree canopy cover across the Perth Metropolitan Region using CSIRO's Urban Monitor aerial stereo orthophotography, taken in March 2009. The high resolution of this imagery allowed the team to identify and map urban tree canopy at a scale of just 20 cm. The team then overlaid the Perth cadastre and fine-scale data from the Australian Bureau of Statistics to measure the percentage tree canopy cover on public and private land within Perth residential areas. A snapshot of this process is shown in the image below.



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The team also developed a statistical model to uncover whether tree canopy cover was related to the age of the neighbourhood, location (for example, whether a neighbourhood was in the Perth Hills or on the coastal plain, or nearby or distant from a river), socio-economic factors, and characteristics related to urban form such as dwelling densityand the proportion of private residential land covered by buildings. The characteristics of the built environment are particularly important given recent trends towards declining in lot size and increasing building footprints.

Within the residential areas of Perth, 85% of the total tree canopy cover (by area) was located on privately owned land, with the remaining 15% on public land. While this total figure reflects the much larger proportion of land under private ownership compared with public ownership, tree canopy cover is proportionally higher on private land. Across Perth, an average of 12% of privately owned land was under the canopy of trees, while tree canopy cover was 8% over public land.

Based on statistical modelling, the most significant influence on tree canopy cover was neighbourhood age, with older neighbourhoods having greater tree cover. The second most important influence on tree canopy cover was building footprint ratio, with areas with proportionally larger building footprints having lower tree canopy cover. Location also played an important role, with neighbourhoods in the Perth Hills and close to the Swan and Canning Rivers higher canopy cover.

The difference in building envelopes, neighbourhood age and the proportion of vegetation within the public realm is illustrated in the image below comparing a typical block in the newer area of Ocean Reef (developed approximately 20 years ago) with one in the established suburb of Claremont (approx. 90 years old).

Although dwelling density in the two neighbourhoods is actually very similar, buildings cover 42% of the private land in the Ocean Reef example compared to 32% in Claremont. In addition, the Ocean Reef neighbourhood has only very sparse street vegetation cover. Overall, these characteristics result in a stark difference in total vegetation cover which sits at 40% in Claremont, and only 15% in Ocean Reef.

The research team at the Clean Air and Urban Landscapes Hub is continuing to develop this and other work, with the aim of providing information on trends in canopy cover and urban greening to those involved in determining the future of our urban forests. Not all of the factors driving difference in tree canopy cover among neighbourhoods can be addressed by policy. Those variables that can be considered by planners, policy makers and developers include building footprint, dwelling density and street layout (as areas with more connected streets and intersections tended to have fewer trees).

Continued development at higher densities in conjunction with increasing building footprints, will see increasing pressure on the ability of public residential land to offset loss of tree canopy on private land within the residential areas of Perth and Peel. This pressure highlights the need to consider opportunities to increase tree canopy yields on public land whilst at the same time considering changes to planning policy to facilitate higher levels of tree canopy retention or creation on private land.

Clean Air and Urban Landscapes Hub
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Source: University of Western Australia