How much do we value green spaces?

What is the value of parks, trees and backyards? Should we be investing in more greenery in our urban centres? How much should we spend on this? Research has shown that people are willing to pay up to 16% more for a house with greater access to green spaces, demonstrating the high value placed on green infrastructure in Australia.

It's hard to imagine Australian streets without trees, suburbs without parks and urban centres without greenery, and few of us would want to. We all have an intuitive sense that plants, trees and green spaces improve our health and well-being, increase the amenity of our cities, reduce their environmental impact and encourage ecological diversity (all of which have been supported by extensive research). However, unless a dollar value is assigned to these benefits, they can be overlooked by policy-makers, possibly resulting in an under-investment in urban greenery. To address this, a recent study helped to put a price on the value of green infrastructure in Australia.

What is green infrastructure?

The term green infrastructure refers to the public and private green spaces in our cities that can provide a range of water cycle benefits if they are managed as an integrated system. These green spaces range in scale: from single trees in a city street to golf courses, parks and waterway corridors that can shape the urban landscape. Some are natural, such as areas of remnant native vegetation, while others are more engineered, such as green roofs, green walls, biofilters and raingardens.

What is the value of green infrastructure?

We recognise that people generally prefer to live in greener suburbs – areas where there is more green infrastructure. The CRCWSC study looked at how much extra people have paid to live in these suburbs, and used this extra amount as an indicator of the value of green infrastructure.

The study confirmed that people are willing to pay more to live in these areas: increasing the amount of green infrastructure by a one standard deviation led to an increase in house prices of between 8.62% and 15.57% ($32,139 to $57,991 for the average house). Put another way, if green infrastructure equivalent to a 440 acre park (which is roughly one standard deviation) was introduced to a typical suburb, the benefit of this would be valued by residents and prospective home buyers at $32,139 - $57,991 per property.

How was the value of green infrastructure determined?

Since there is no market for green infrastructure, and therefore no way to directly observe the community's willingness to pay for it, the study employed the Hedonic Pricing Model. The Hedonic Pricing Model uses variations in property prices to determine the amount people are willing to pay for certain characteristics of a property (in this case, improvements in urban greenery). Any additional amount that people pay for houses in greener suburbs, compared with similar houses elsewhere, enables the value of green infrastructure to be estimated.

The study drew on data from 2,531,803 house sales across Australia between 2000 and 2010, and used the Enhanced Vegetation Index (EVI) as a proxy for green infrastructure. The EVI detects changes in vegetation coverage from satellite images and enables the comparison of different areas.
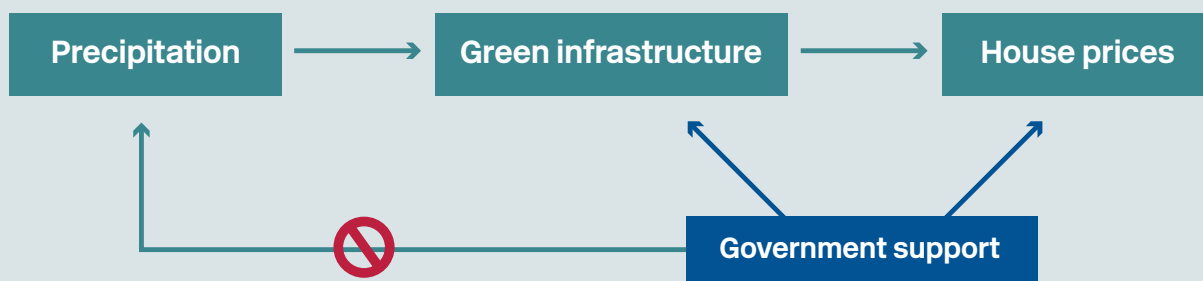
Additional steps were taken in the study to ensure the difference in values could truly be attributed to the green infrastructure. To manage an effect called endogeneity (see explanation below), precipitation data was added to the statistical model. This helps to distinguish the effect of vegetation as a variable from other, unobservable, variables in explaining the differences in prices paid for houses.

Endogeneity and the instrumental variables approach

Any statistical analysis of the relationship between house attributes and house prices must account for all factors that could have a bearing on price. Common, observable variables such as property size, number of bedrooms and number of car spaces can be easily controlled. Other unobservable variables like crime levels, quality of local schools and proximity to shopping centres may also exist which, unless addressed, will bias the results. This is a particular problem where the unobservable variables affect both house prices and the variable of interest (in this case, the level of green space). It is known as the problem of endogeneity.

To see why it's a problem, imagine that an increase in government funding results in an improvement in a suburb's schools, public transport and infrastructure, including green space. In this case, any rise in house prices would be due to the government's new policy, not the increase in green space. But if the government policy isn't taken into account, it may look like the increase in green space is driving the property price rise, resulting in an overestimation of its value.

To avoid this, an instrumental variable is incorporated into the analysis. The instrumental variable is correlated with the variable of interest (green space) but unrelated to the dependent variable (house prices). By running a two-stage statistical analysis with an instrumental variable, more reliable estimates can be obtained. In the study, precipitation data was used as the instrumental variable as it is correlated with green space but unlikely to influence house prices.

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Precipitation  →  Green infrastructure  →  House prices
       ↑                                          ↑
       🚫─────────────── Government support ──────↗
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Summary

This study is one of several conducted by the CRCWC to understand the non-market values of a water sensitive city, particularly those associated with liveability benefits.

This study confirms that there is a value associated with greener suburbs and by extension, green infrastructure. It also shows that this value is material, with a premium of up to 16% being paid for houses in these suburbs.

Further work is required to understand why people are willing to pay extra, or how they might prioritize the different benefits they receive. But given the significant value now associated with urban vegetation and green spaces, it is important that policy-makers take green infrastructure and its social value into account when developing urban planning and water policy.

Further reading
Norton, B. A., Coutts, A. M., Livesley, S. J., Harris, R. J., Hunter, A. M. and Williams, N. S. G. (2015). Planning for cooler cities: A framework to prioritise green infrastructure to mitigate high temperatures in urban landscapes. Landscape and Urban Planning, 134, pp. 127-138.

Rossetti, Joe, "Valuation of Australia's Green Infrastructure: Hedonic Pricing Model Using the Enhanced Vegetation Index", Honours thesis, Monash University, 2013. https://datainspace.org/wp-content/uploads/2017/04/Joe-Rossetti-2013-Thesis-1.pdf

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