

The Presenters



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What to Plant Where?

Cooling Solutions for Eastern Suburbs Homes



MACQUARIE
University



WESTERN SYDNEY
UNIVERSITY



GREEN CITIES
FUND



Future Proofing Residential Development to Climate Change

Modelled Eastern Beaches homes to determine the effects of future climate change on:

- Thermal comfort
- Energy and water use
- Greenhouse emissions

Key finding: under climate change keeping our homes cool will be much harder



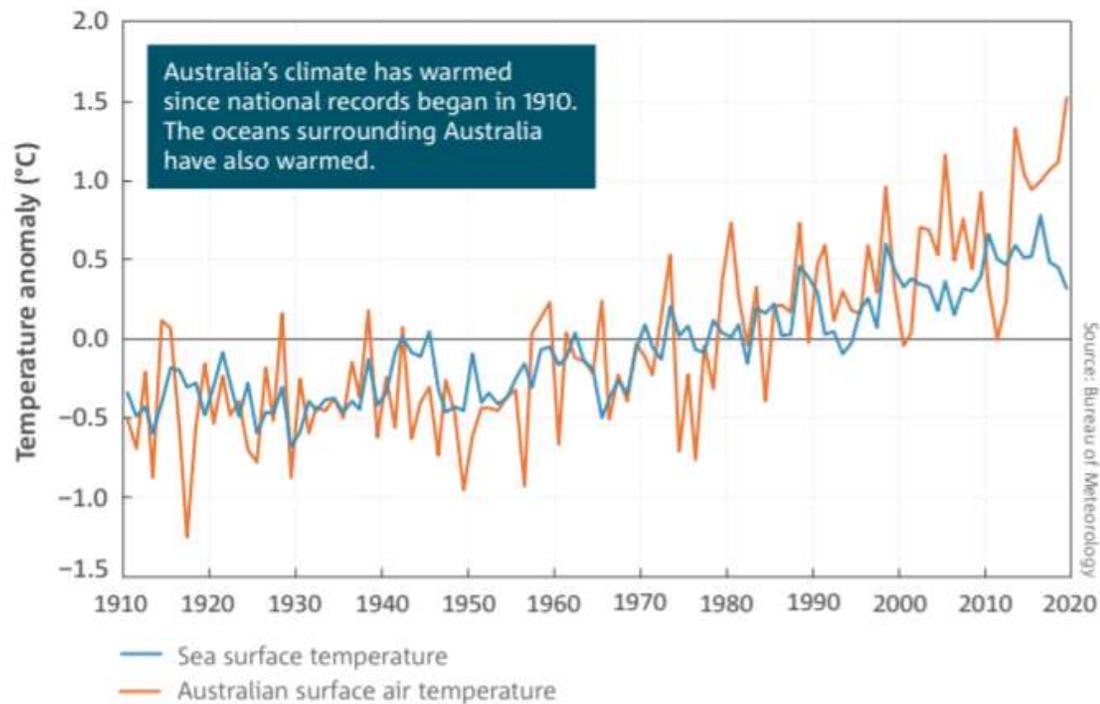
This project has been assisted by the New South Wales Government and supported by Local Government NSW, and our council partners.



Talk Structure

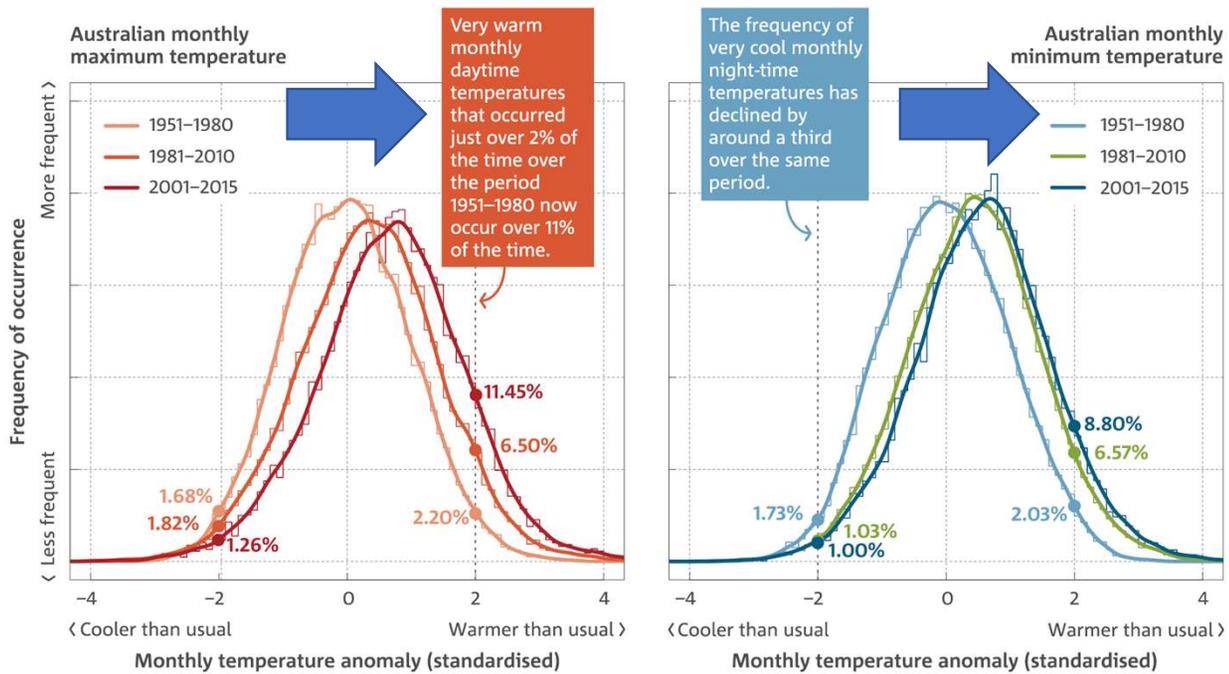
1. Climate change and urban heat
2. How vegetation can cool your home and other benefits
3. Other cooling and shading solutions for your home
4. Choosing climate-ready species (Eastern suburbs)

Warm is the New Norm



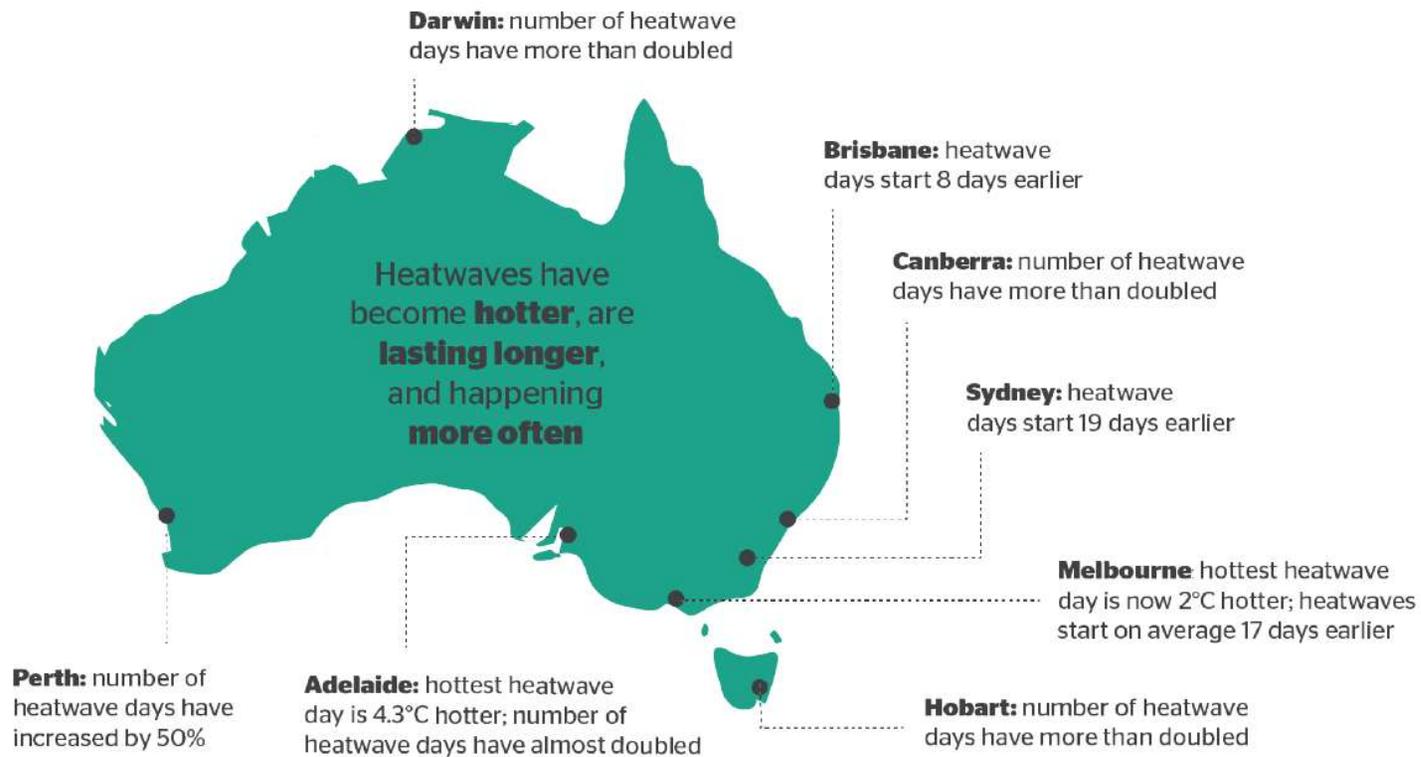
But why does 1°C matter?

1°C Shifts the Means



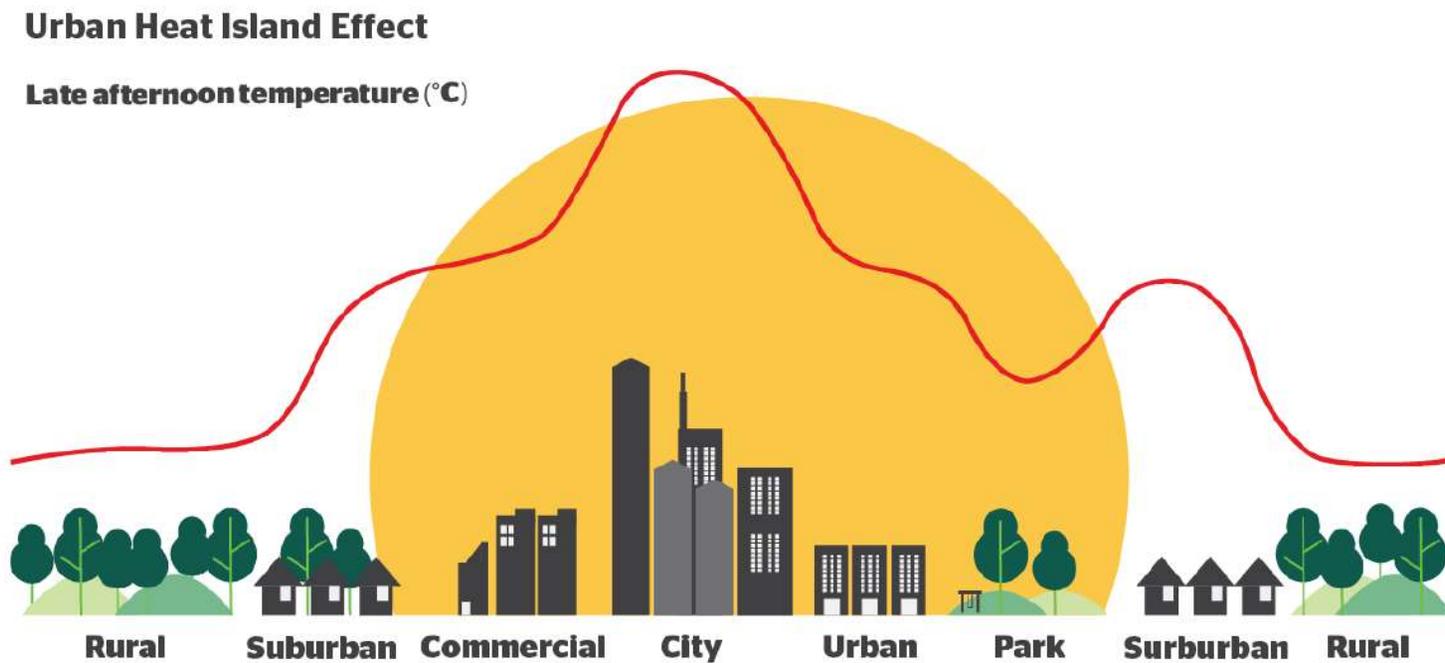
More **hotter** days and less **cooler** days

What does this mean for Australia?

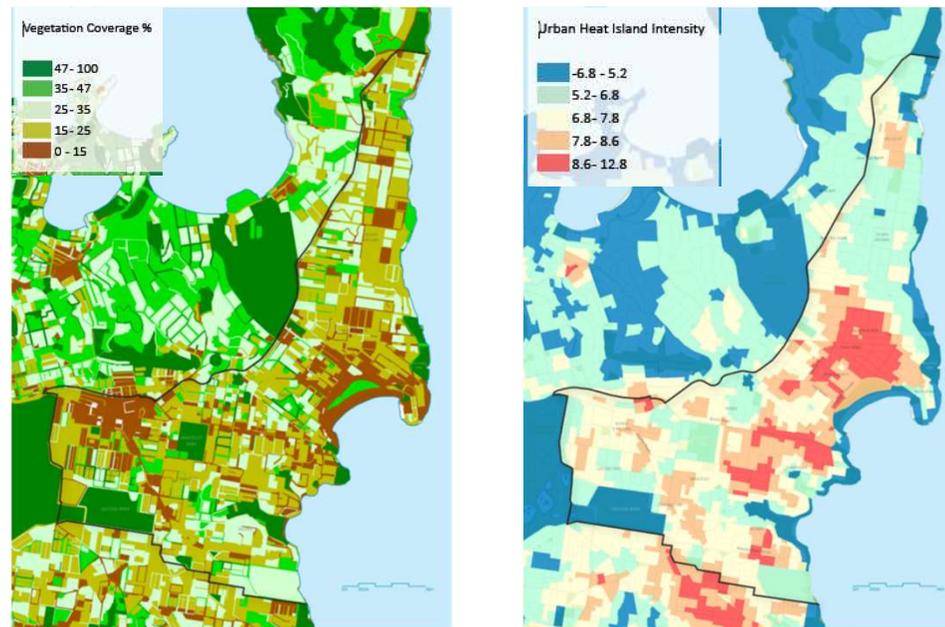


Study: Perkins & Alexander 2013
Image: ACF 2021

Don't forget the Urban Heat Island Effect

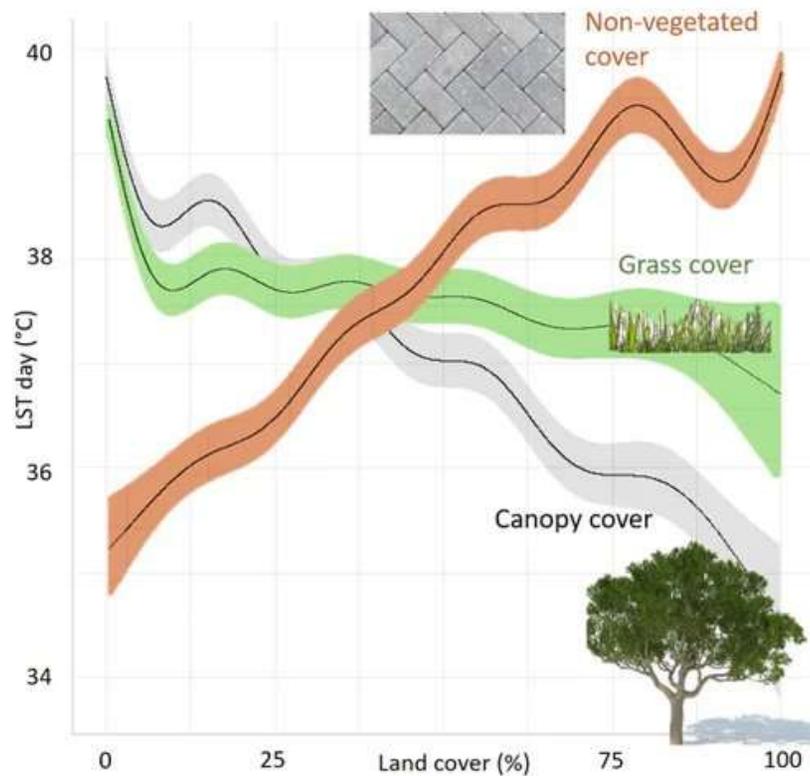


Urban Greening is the Key



Maps showing vegetation cover and urban heating in Waverley and Woollahra

Urban Greening is the Key

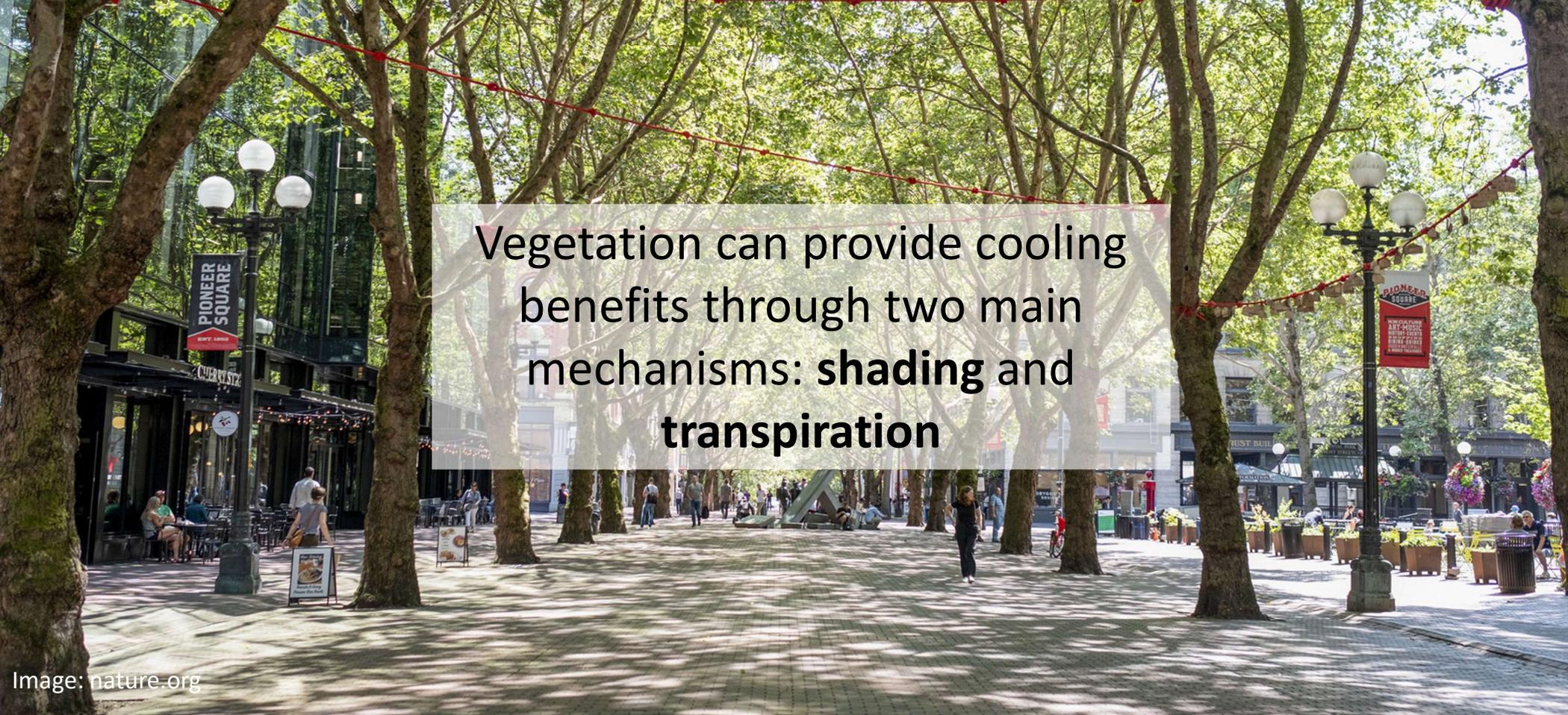


- Vegetation lowered land surface temperatures by up to 6°C on an extreme heat day
- The type of vegetation also matters
- Residential gardens are important (20% of land area but 40% of tree cover)



Study: Ossola et al. 2021

How Does Vegetation Cool Your Home?

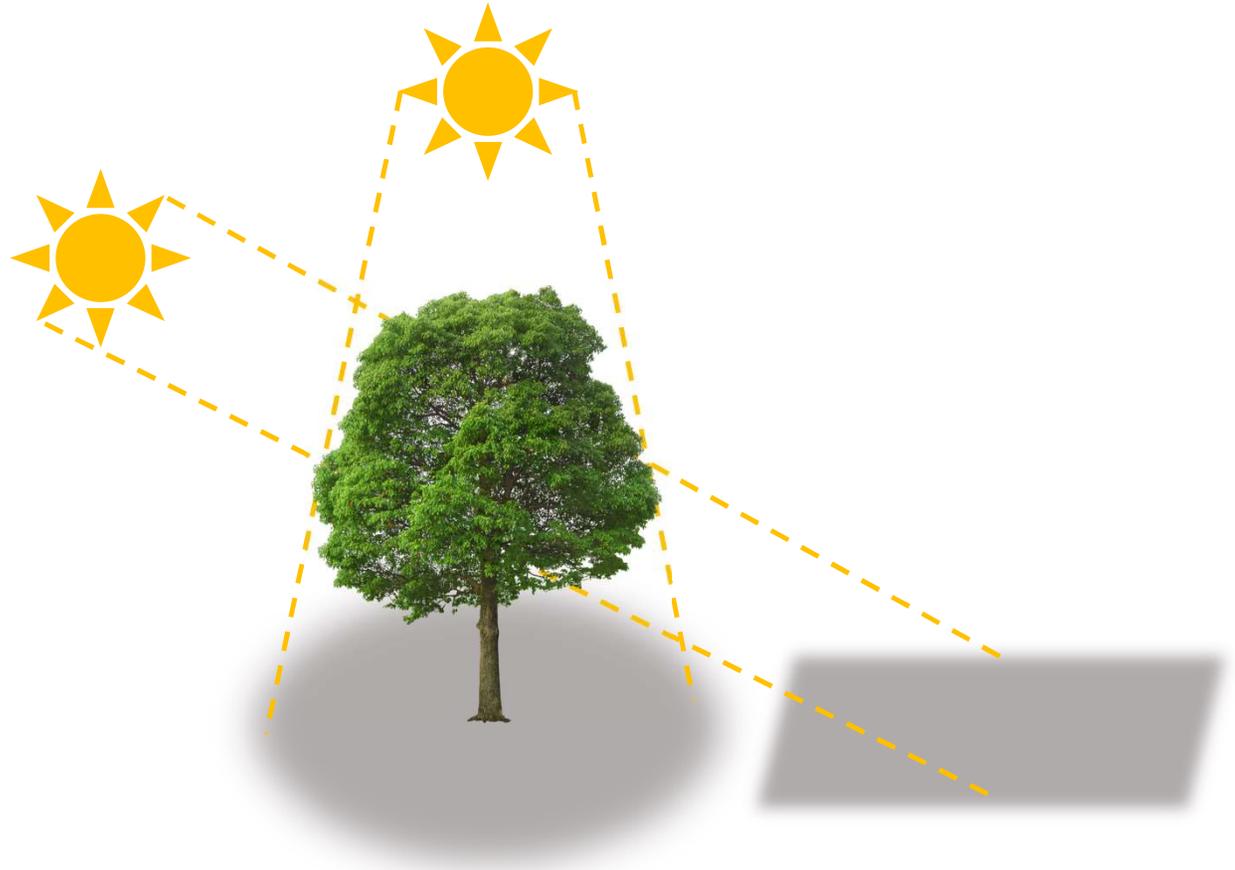
A wide, tree-lined pedestrian walkway in Pioneer Square, Seattle. The walkway is paved with light-colored bricks and is flanked by large, mature trees with dense green foliage. People are walking and sitting on benches. In the background, there are buildings and streetlights. A semi-transparent text box is overlaid in the center of the image.

Vegetation can provide cooling benefits through two main mechanisms: **shading** and **transpiration**

All About Shade

Shade Quantity

- Amount of land area that can be shaded by a plant
- Influenced by shape of the plant and position of the sun
- *Wider canopies = larger shade footprint when sun is high*
- *Taller canopies = longer shade footprint when sun is low*



All About Shade

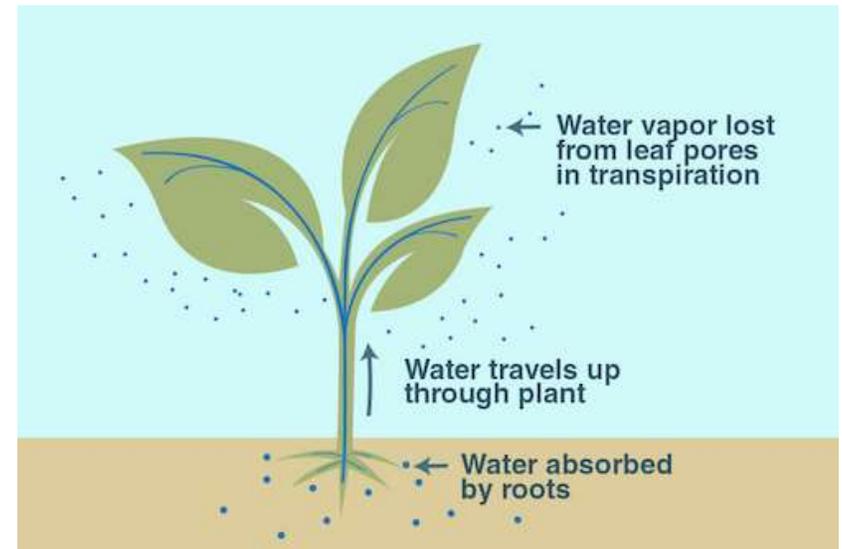
Shade Quality

- Influenced by the density of foliage
- The denser the canopy, the better the quality of shade
- Shade provided vary between species and life stages



What Is Transpiration?

- Process by which plants return water to the atmosphere through small openings in the leaves (stomata)
- Plant's way of sweating
- Improves thermal comfort around plants
- The cooling benefit of vegetation becoming more important



Other Benefits of Trees/Urban Vegetation

- **Resources for wildlife**
 - food, shelter, connectivity
- **Carbon sequestration and storage**
- **Stormwater reduction**
- **Noise reduction**
- **Air pollution removal**
- **Social benefits**
 - improves community congeniality
 - reduces stress



Barangaroo Reserve, Sydney

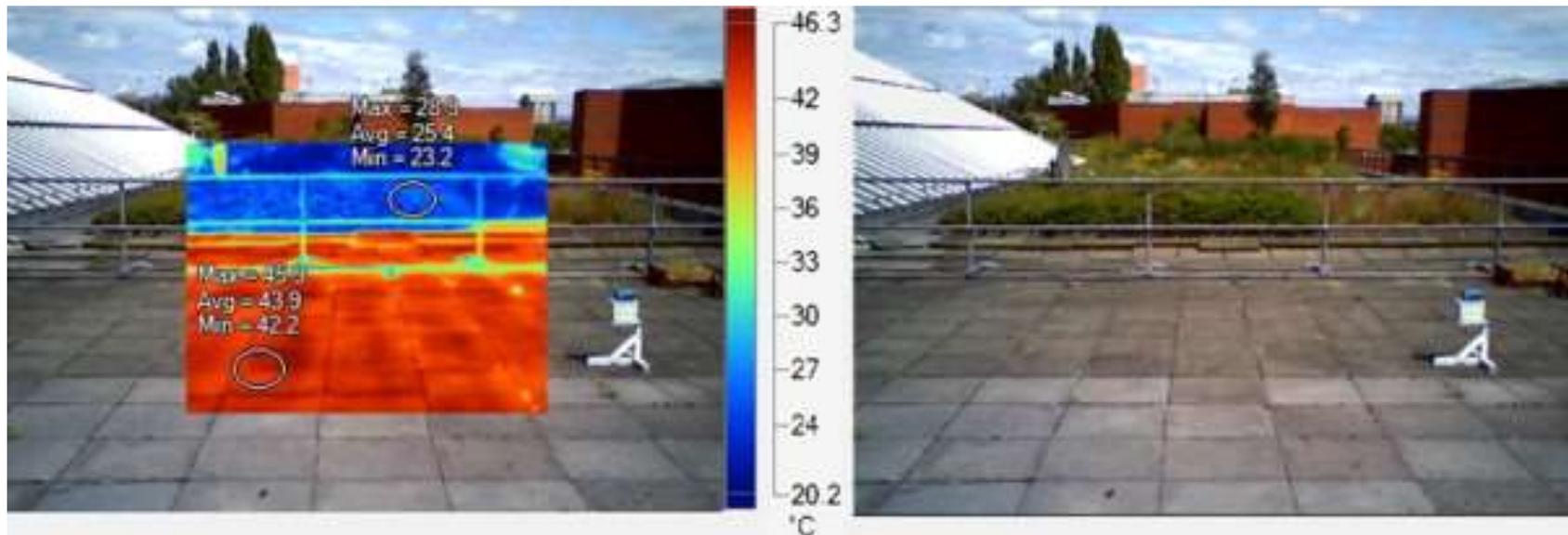
Green Roofs and Walls

- Artificial structures which are partially or fully vegetated
- Often planted with succulents, mosses and grasses
- How do they cool?
 - Shading
 - Transpiration
 - Traits of the plants used



Green roof in Darling Quarter, Sydney

Green Roofs and Walls



Green roofs can be up to 20°C cooler than bare roofs

Understanding the Solar Arc

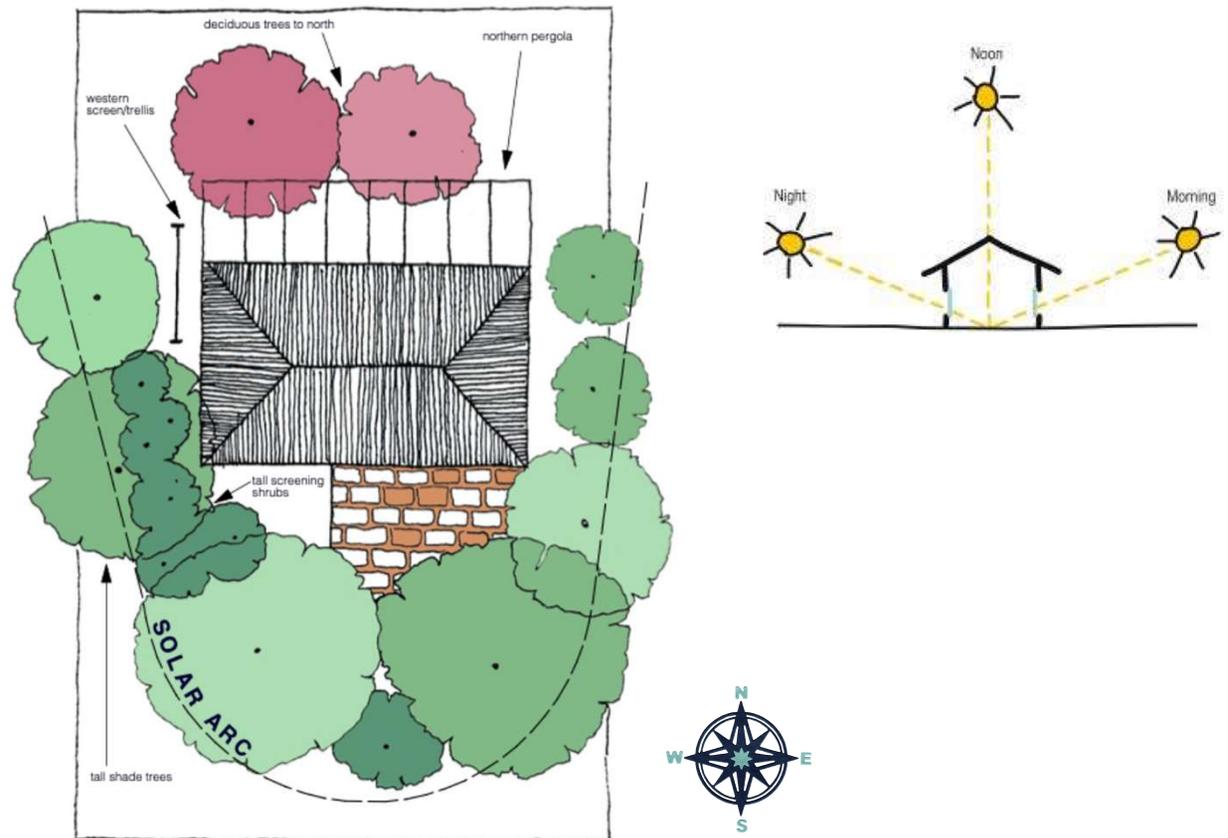


Image: COOLMob Shade Trees Flyer

Shading: Vertical trellis or lattice screens

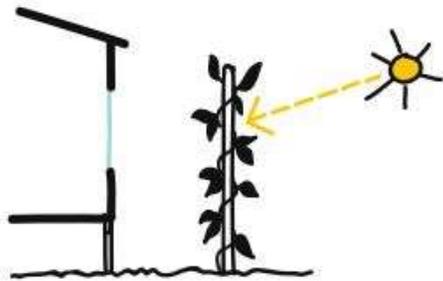


Figure 11 Trellis or lattice screens are effective for shading east and west-facing aspects.

Image: Townsville Council



Image: Better Homes and Gardens

Shading options: Shade cloth & pergola



Image: Your Home

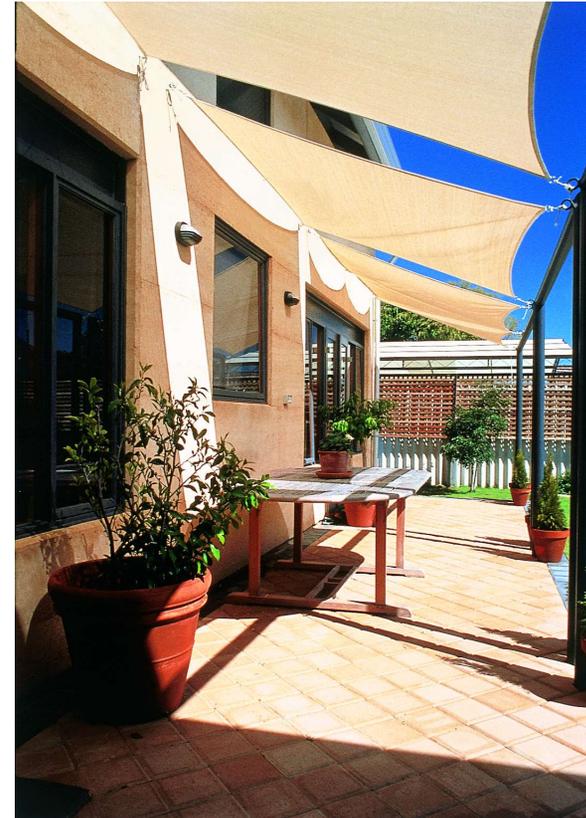


Image: Your Home

Vertical shading



Image: DPIE



Image: 2030palette.org

Horizontal shading



Image: Oztech



Image: Carbolite



Image: Simon Wood Photography

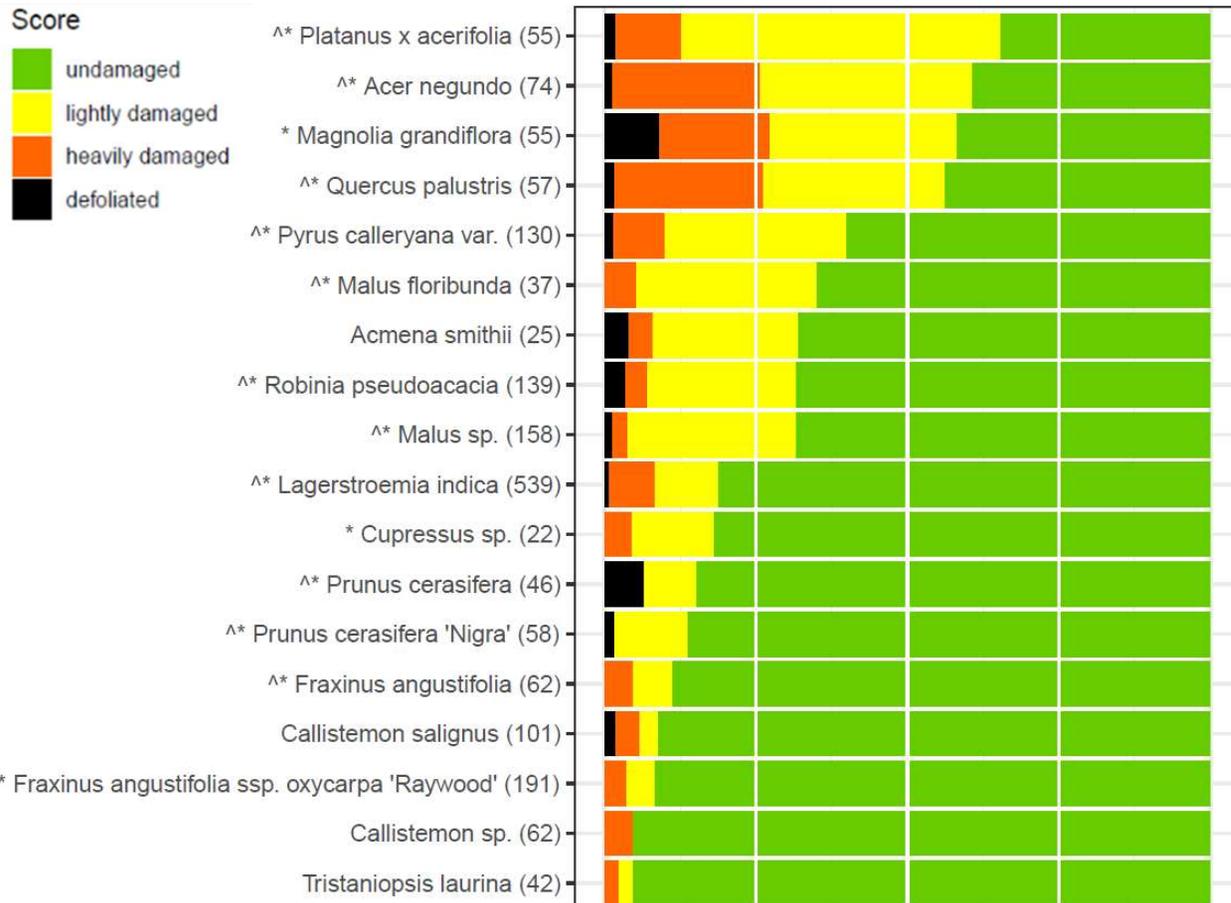
Other important considerations

- High performance glass + ventilated skylights
- High-performance low solar gain low-emissivity glass
- Light coloured roof & walls
- Insulation
- Ceiling fans & openable windows



Image: Henley

Choosing Climate-Ready Species will be Important



Almost **10%** of street trees experienced canopy damage

Study: Tabassum et al., 2021

The Which Plant Where Project

Future proof urban landscape projects with climate ready species

Search location

Search species

Location

Search for location or postcode



 Urban Space Type: Garden Park Street WSUD

Species that will Survive and Thrive



Heath Leaved Banksia (*Banksia ericifolia*)

- Fast growing shrub/tree to 7m
- Naturally occurs around the Sydney region
- High drought and coastal tolerance
- Excellent food source for honey eating birds



Scrub She-Oak (*Allocasuarina distyla*)

- Medium shrub/tree to 6m
- Excellent as a roadside or park planting as it acts like a windbreak
- High drought and coastal tolerance
- Separate male and female plants
- Fruit of female plants food source for large parrots and cockatoos, habitat for small birds

Species that will Survive and Thrive



Lilly Pilly (*Acmena smithii*)

- Fast growing shrub with pink new growth and white flowers
- Native to QLD, NSW and VIC
- Fruit is edible and can be made into jam



Coastal Rosemary (*Westringia fruticosa*)

- Fast growing shrub up to 2m tall
- Native to NSW
- Excellent coastal tolerance
- Good for hedging and topiary

Species that will Survive and Thrive



Bracelet Honey Myrtle (*Melaleuca armillaris*)

- Fast growth shrub with white flowers
- Well suited to coastal conditions
- Works well as a screen
- Birds are attracted to the nectar in the flowers



Golden Guinea Vine (*Hibbertia scandens*)

- Fast growing climber
- Native to NSW and QLD
- High drought tolerance
- Good for growing along fences or as a groundcover

Species that will Survive and Thrive



Cut-Leafed Daisy (*Brachyscome multifida*)

- Perennial herb that produces purple flowers all year round
- Drought tolerant
- Works well when mass planted for a groundcover



Weeping grass (*Microlaena stipoides*)

- Perennial grass
- Very low maintenance
- High drought tolerance
- Can be mass planted as a groundcover

Plant water smart

- **Choose local native plant species** with low water requirements where possible.
- **Plant an understorey of groundcover and mulch** to reduce moisture loss from the soil, and consider ways to increase the water holding capacity of the soil, such as biochar.
- Install a **rainwater tank** to collect water and help to irrigate your garden, and consider efficient watering systems such as **drip irrigation with a smart control system**.
- **Water early in the morning** so plants have enough water to keep themselves cool during the heat of the day.

Resources

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