Green Infrastructure Lab

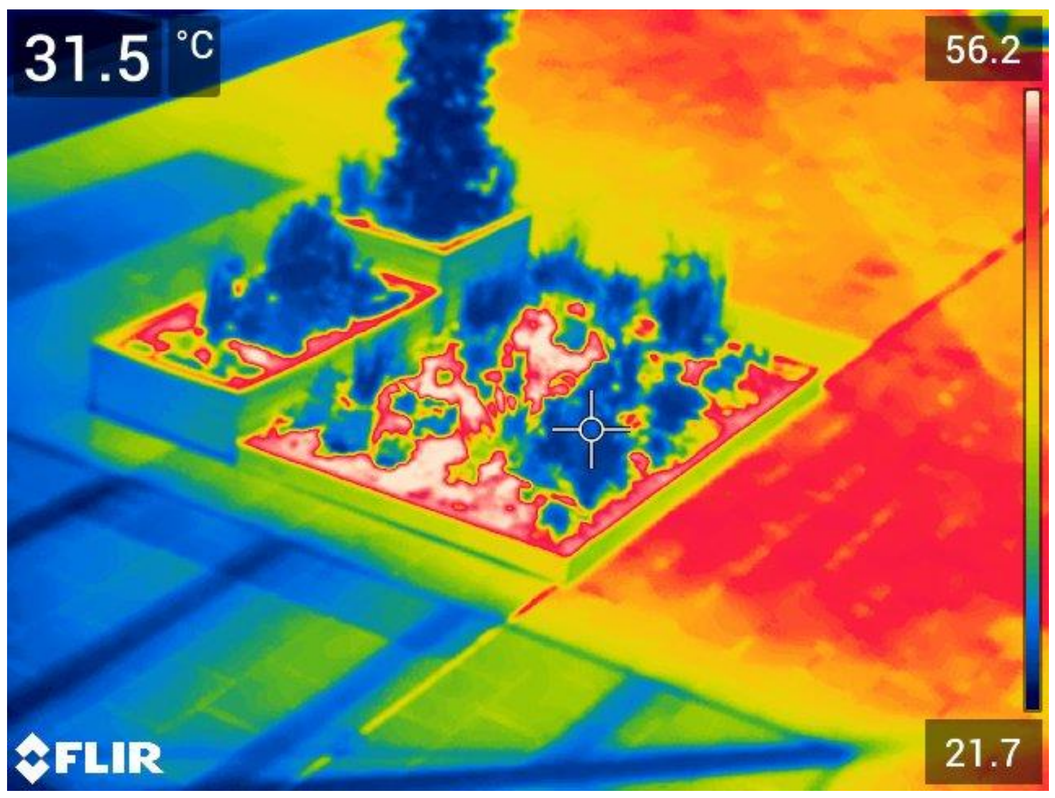
UTS

STUDENT RESEARCH

Plantabox parklets for reducing urban heat

SYNOPSIS

The urban heat island effect is countered by the cooling influence of urban green infrastructure, facilitated partially by the increased reflectivity and moisture release from vegetation. This investigation aimed to explore this phenomenon in two densely populated suburbs with high heat exposure in Western Sydney. Temperature loggers were deployed to analyze the local climates of Plantabox Parklets, while FLIR thermal imaging was utilized to evaluate surface temperatures. A notable discrepancy in average daily temperatures was noted, thermal imaging revealed temperature differentials of up to 25°C between the experimental and control areas, while specific plant species demonstrated exceptional cooling properties. Notably, *Pratia puberula*, *Plectranthus* sp., *Pittosporum* sp., *Neomarica gracilis*, and *Stenotaphrum secundatum* exhibited the most pronounced cooling effects among the observed vegetation.



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OBJECTIVE

This investigation aimed to explore the heat reduction potential of Plantabox parklets in two densely populated suburbs with high heat exposure in Western Sydney.

METHODOLOGY

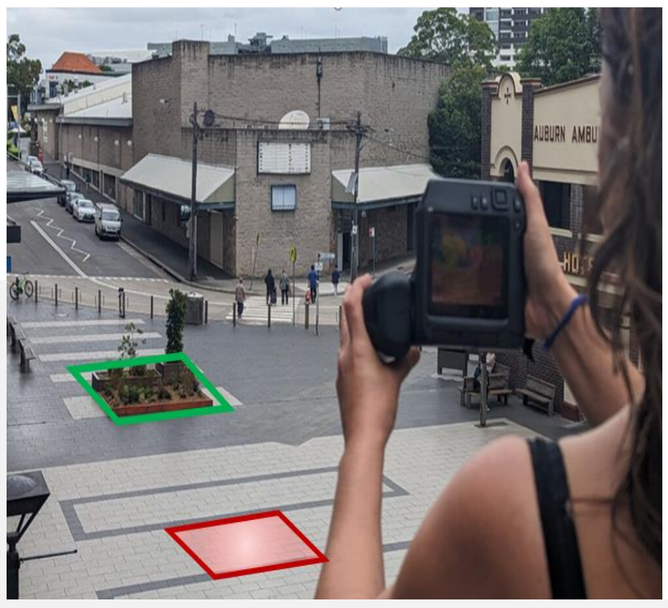
Temp loggers within the test sites positioned 60cm above the substrate (T_1), on top of the bark layer (T_2), and 20cm below the substrate surface (T_3)

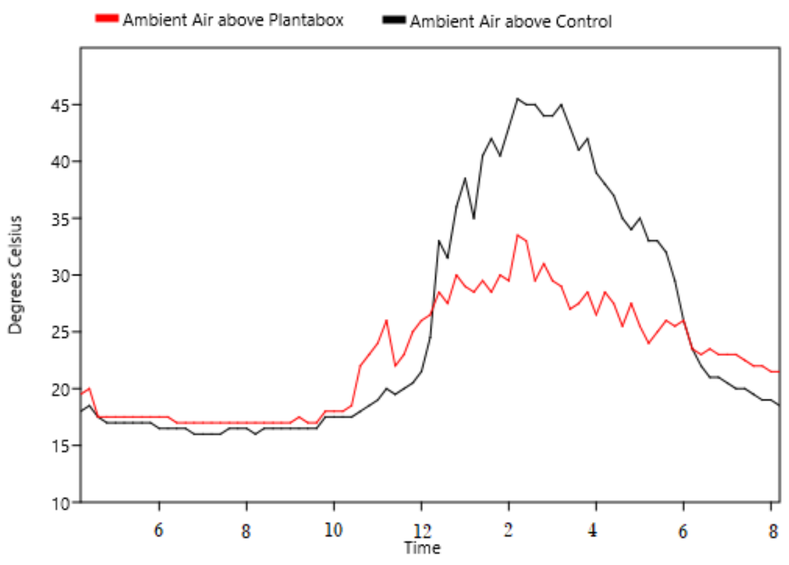
ESTIMATED RESEARCH LENGTH

Stage 1 Data Collection – 2 months
Stage 2 - TBC

BACKGROUND

The urban heat island (UHI) effect occurs when heightened heat from the land surface is transferred into the atmosphere in urban areas. Substituting vegetated regions with impermeable surfaces like concrete, stone, glass, steel, and bituminous materials substantially diminishes urban areas' ability to regulate temperature. These surfaces absorb solar heat during the day and emit it as infrared radiation overnight.
Strategies for urban greening have garnered considerable attention in both academic circles and urban policy discussions, with urban parklets emerging as a distinctive means to expand green spaces in cities without sacrificing valuable land.





EXPECTED RESEARCH CONTRIBUTION

Here we present experiments focusing on thermal performance of Plantabox parklets. Thermographic imaging and temperature sensors revealed reductions in surface temperatures of up to 17 and 25°C, for Parramatta and Auburn respectively. These results are consistent with previous findings, indicating this technology could mitigate urban canyon heat, particularly during summer and extreme heatwave conditions. The presence of the Plantabox parklets significantly influenced the street canyon microclimate, with shaded ambient temperatures being up to 50% cooler than the control area. This cooling effect is likely attributed to the evapotranspiration of plant foliage, albedo and reduced thermal mass of the plants compared to the pavers in the control experiments.

REFERENCES

Fleck, R., et al. "Bio-solar green roofs increase solar energy output: The sunny side of integrating sustainable technologies." *Building and Environment* 226 (2022): 109703.
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