CSIRO - Cities Research

Urban Living Labs and Heat Mitigation

22nd September 2017

CSIRO LAND AND WATER
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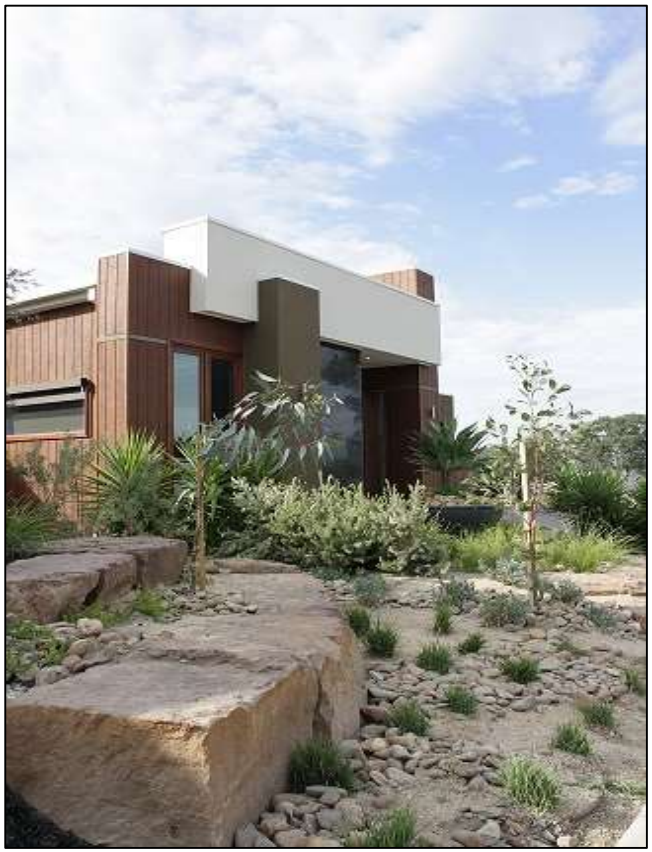
Photo source: ABC News (2017) http://www.abc.net.au/news/2017-06-10/food-provenance-movement-boosting-darwins-market-scene/8606220,

Structure of presentation

1. Urban challenges and the need for innovation

2. Urban Living Labs for place-based collaboration

3. Urban greening research



CSIRO's Zero Emission House, near Melbourne

Urban challenges and transformation

- We are in a period of major change
- The *status quo* is becoming less tenable
- How do we maintain livability, while improving resilience & sustainability?
- By solving challenges in our cities, can we create a new global export market?

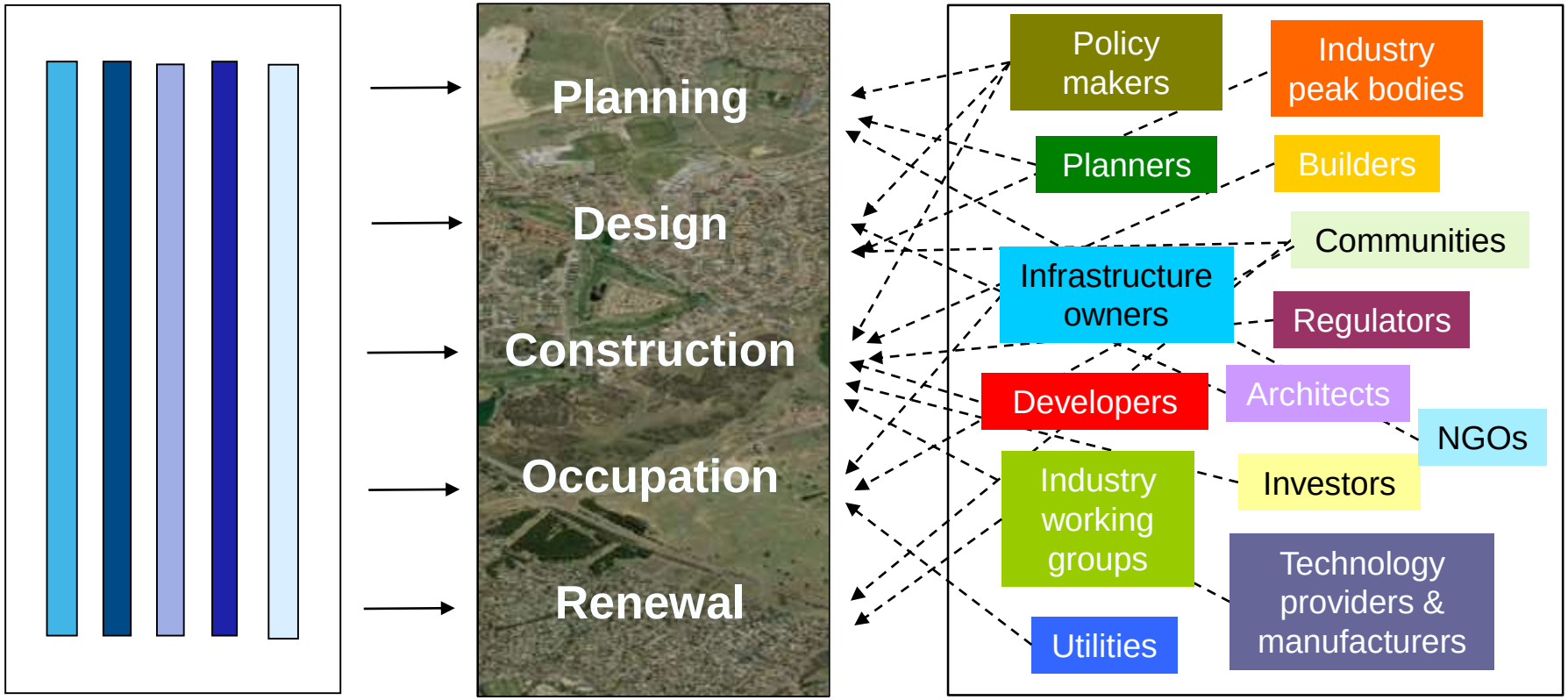
Source: NASA GSFC 2000 (View of Earth's City Lights)

How does an Urban Living Lab work?

Researchers & Innovators

Phases of Development

Actors in the Urban System



CSIRO Urban Living Labs initiative

- Portfolio of Urban Living Labs to be established across the country
- Partnerships and operating models to support long-term research in innovation and experimentation
- Tailored to site context, associated challenges and opportunities
- Innovation pipeline and delivery (monitoring, evaluation & learning)

Science ***IN*** the Lab, Science ***OF*** the Lab

CSIRO's urban greening research - climate adaptation in cities

Building the Business Case for Urban Greening

Photo source: In https://architectureau.com/articles/cooling-a-tropical-city/ , from Image: Clouston Associates

Photo source: http://www.abc.net.au/local/stories/2010/11/22/3073252.htm

- Population growth and urbanisation leading to greater urban density
- Increased impervious areas, with loss of green space and the ecosystem services
- Increasing heat issues and heat waves (climate change)

Research Questions

I. City Scale:

How is vegetation distributed across the City, and how does dwelling density affect access to public and private green spaces?

II. Neighbourhood Scale:

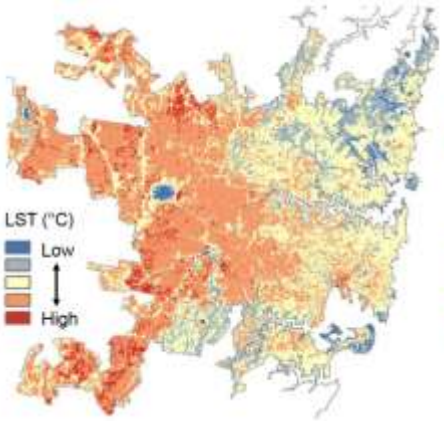
How is vegetation affecting microclimates in important neighbourhood areas – house, street, park?

III. Building Scale:

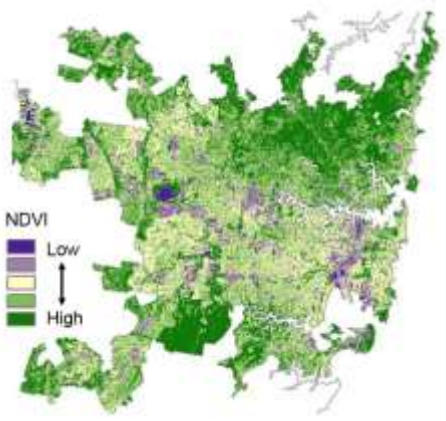
How does tree cover around the house affect indoor temperatures?

I. The patterns and distribution of urban heat

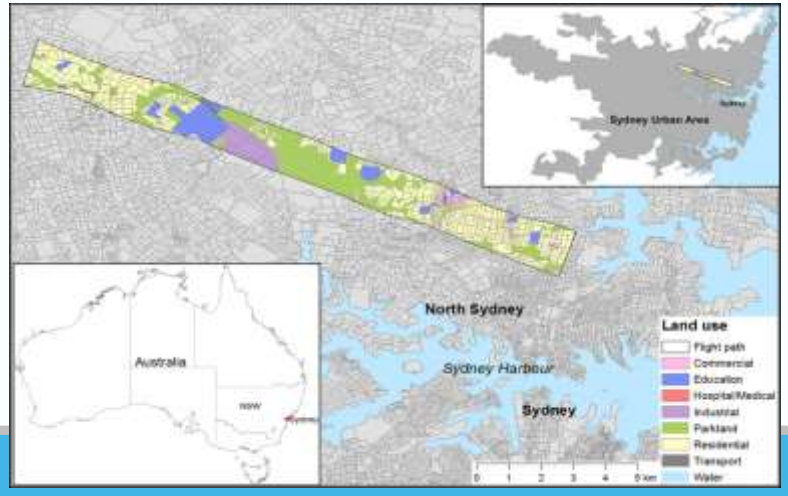
Land surface temperature (LST)



Vegetation cover (NDVI)

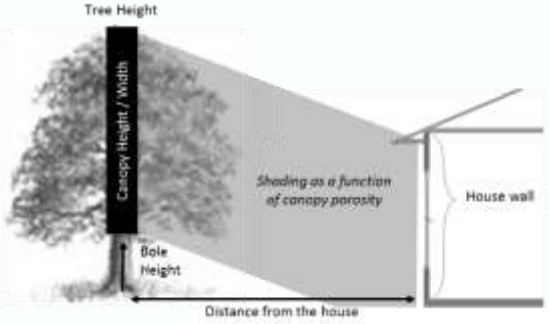


II. Using thermal airborne remote sensing imagery, LiDAR to create land use classifications



III. The potential for tree shade to provide climate regulation services at the household scale

Building performance simulated using energy rating tool AccuRate. 2 performance measures used – HVAC Energy and Discomfort Index



Knowledge Gaps

1. **Developing tools to value the benefits of green infrastructure** – social/health benefits, as well as environmental and economic.

2. **Climate Change** – How can urban greening help communities adapt to a warming climate?

3. **Spatial mapping and thresholds** – What is the minimum canopy extent (or other greening metric) required to provide optimise benefits e.g. cooling, biodiversity, physical activity, health?

4. **Understand community attitudes and behaviours towards green infrastructure –** community acceptance of green infrastructure and understanding of its value?

5. **Research into policy and practice** – What social networks and/or organisational arrangements are needed to deliver urban green infrastructure? What policy instruments will be the most effective?

6. **Public/private ownership** – Most of the existing green infrastructure in cities is located on private lands. How do the opportunities and barriers to urban greening vary according to land tenure?

Thank You

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