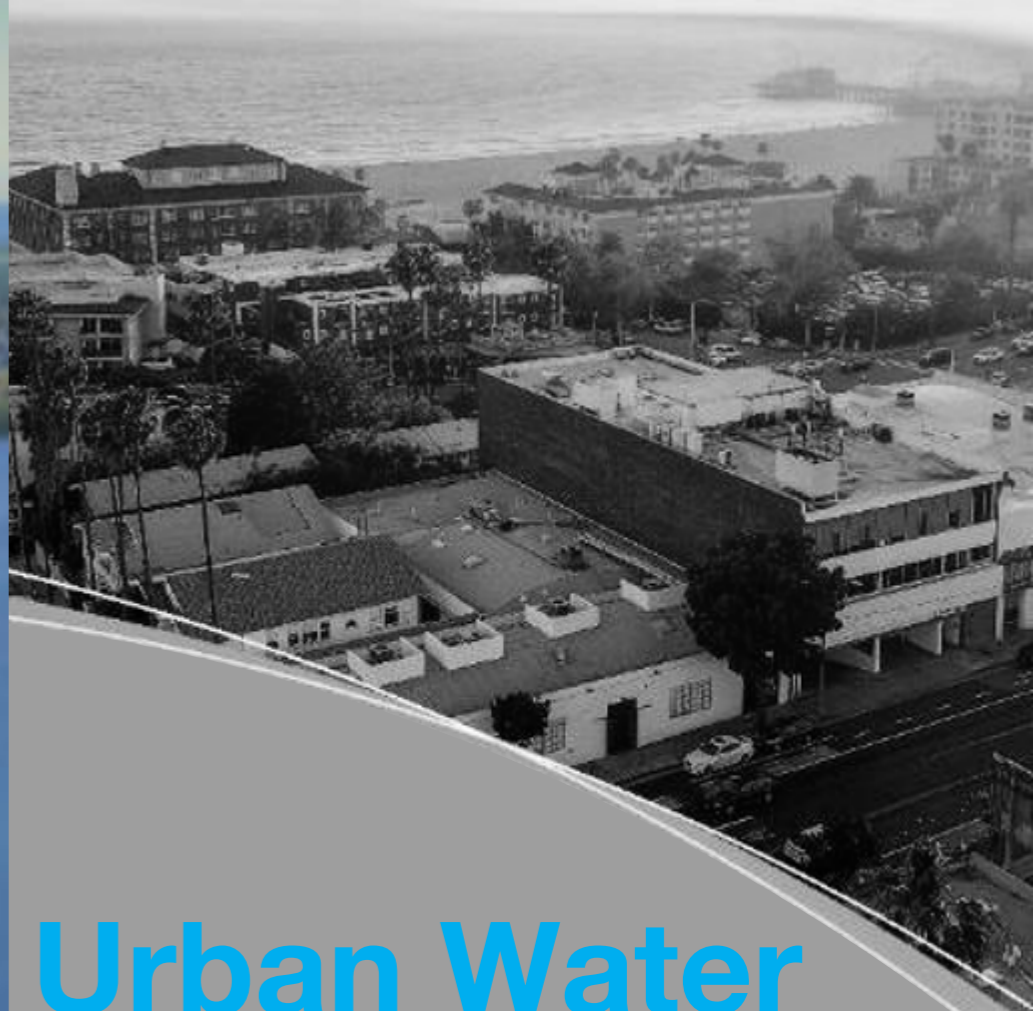




Living in the tropics

Adjunct Associate Professor Roger Mainwood,
Tropical Urbanism Design Lab

TPG Architects



Urban Water Urban Heat Urban Green

The Tropical Urbanism and Design Lab (TUDLab) conducts applied and interdisciplinary research with local, national and international partners to promote sustainable cities and communities.

TUDLab researches and advocates the need for:

- Quality public spaces designed at the human scale
- Equitable development and inclusive urbanisation in the tropics
- Grey, green and blue infrastructures that make tropical cities liveable
- Valuing the knowledge, culture and traditions of Indigenous communities



Living in the tropics

TUDLab Strategic Mission: Tropical, sustainable, liveable

Projects

Master planning projects:

Innisfail, Malanda, Ravenshoe

Smart Catchments: Saltwater Creek

Urban heat island: Sensors in CBD

Planning scheme: Tropical urbanism





Living in the tropics

Tropical Sustainable Design Case Studies

<https://www.jcu.edu.au/tropical-sustainable-design-case-studies>

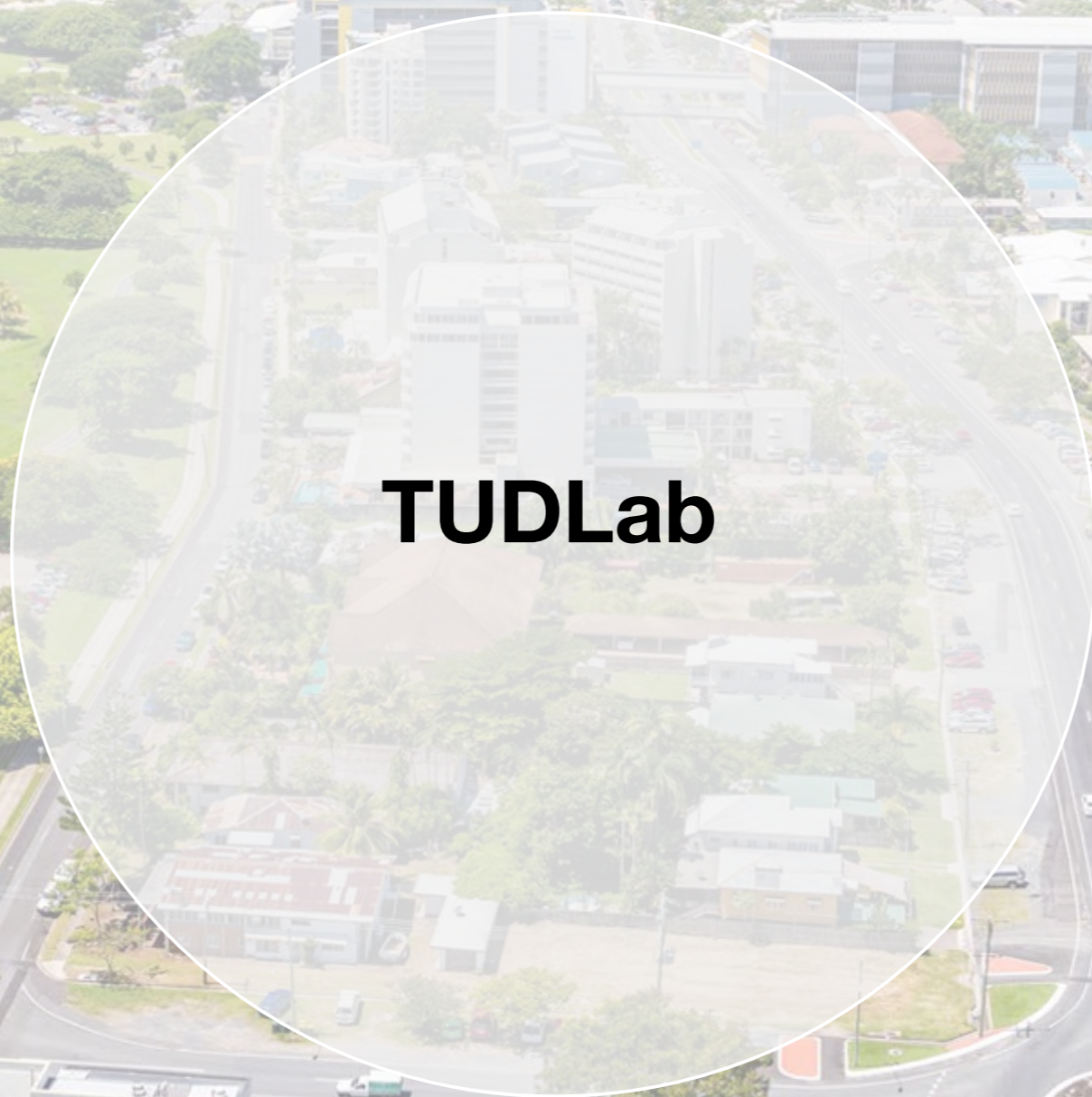
- 1 Smithfield Village
- 2 William McCormack Place
- 3 TAFE Cairns Campus J Block
- 4 Cairns Foreshore





Living in the tropics

TUDLab:



TUDLab

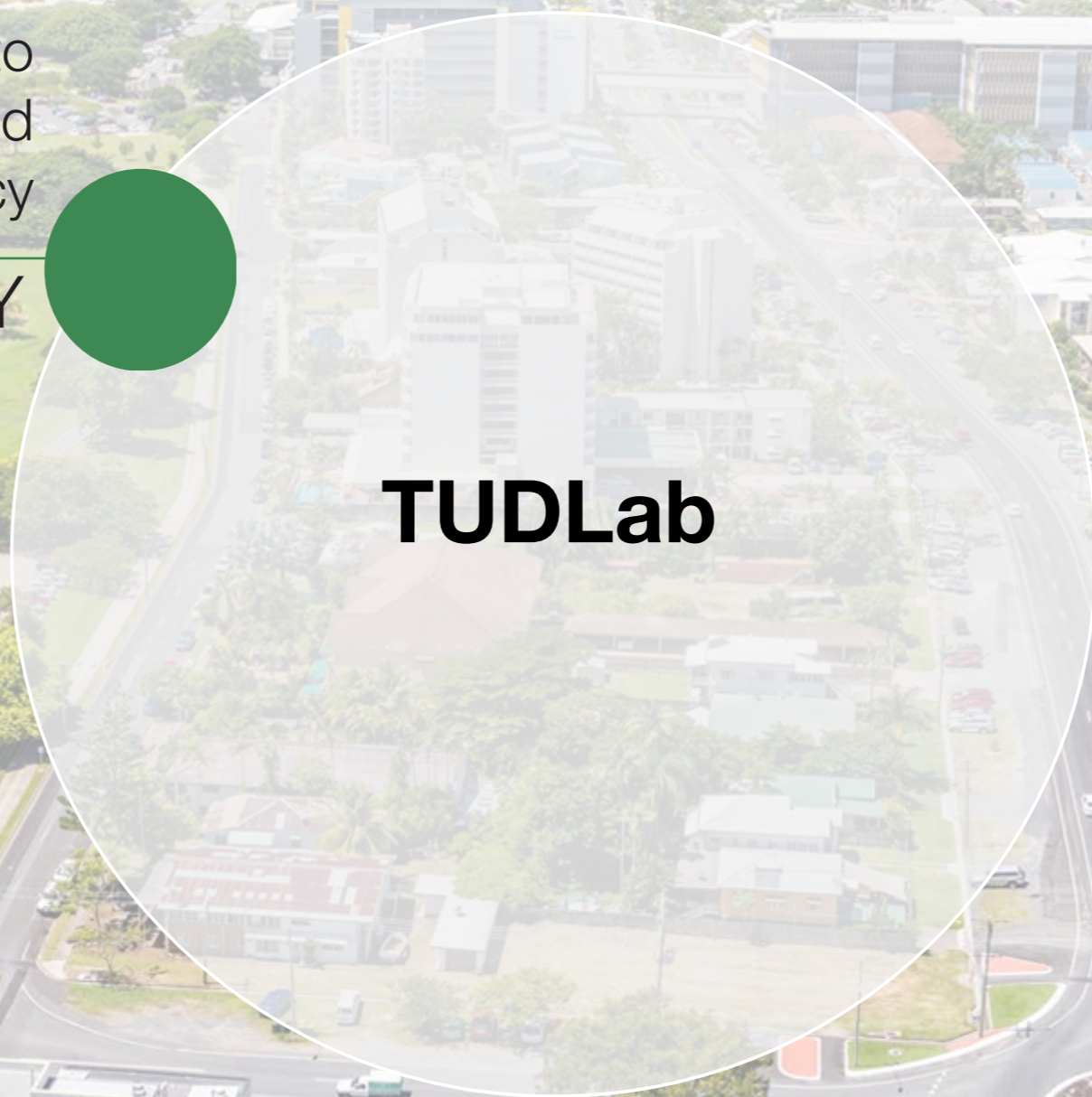


Living in the tropics

TUDLab:

Relating activities to ongoing development and government policy

ADVOCACY



TUDLab



Living in the tropics

TUDLab:

Relating activities to ongoing development and government policy

ADVOCACY

PG Students, Research funding, Conferences, workshops, Publications

RESEARCH

TUDLab



Living in the tropics

TUDLab:

Relating activities to ongoing development and government policy

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PG Students, Research funding, Conferences, workshops, Publications

RESEARCH

TUDLab

PROJECT WORK

Masterplans
Design Studios
Heat island and liveability research



Living in the tropics

TUDLab:

Relating activities to ongoing development and government policy

ADVOCACY

PG Students, Research funding, Conferences, workshops, Publications

RESEARCH

TUDLab

PROJECT WORK

Masterplans
Design Studios
Heat island and liveability research

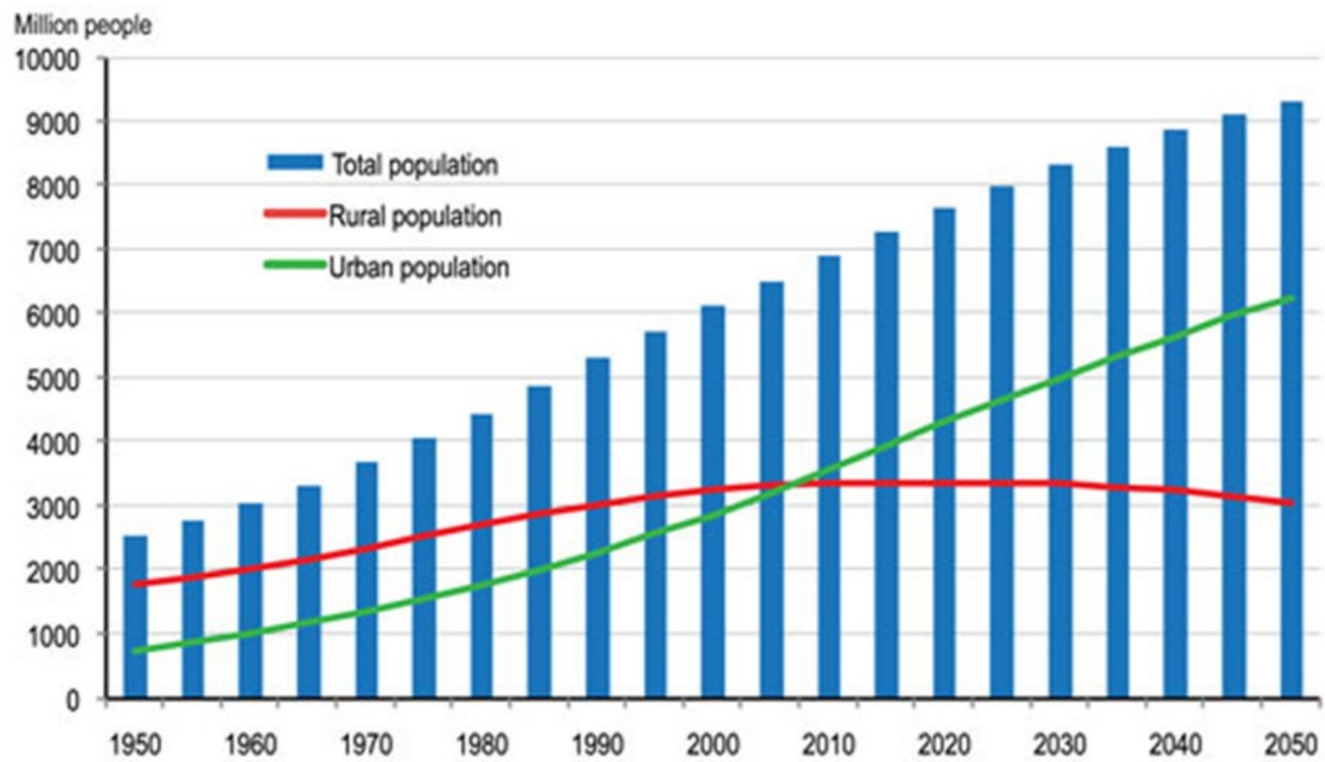
EDUCATION

JCUA, JCUS
Masterclasses, MOOCs, MPUD
Pomeroy Academy

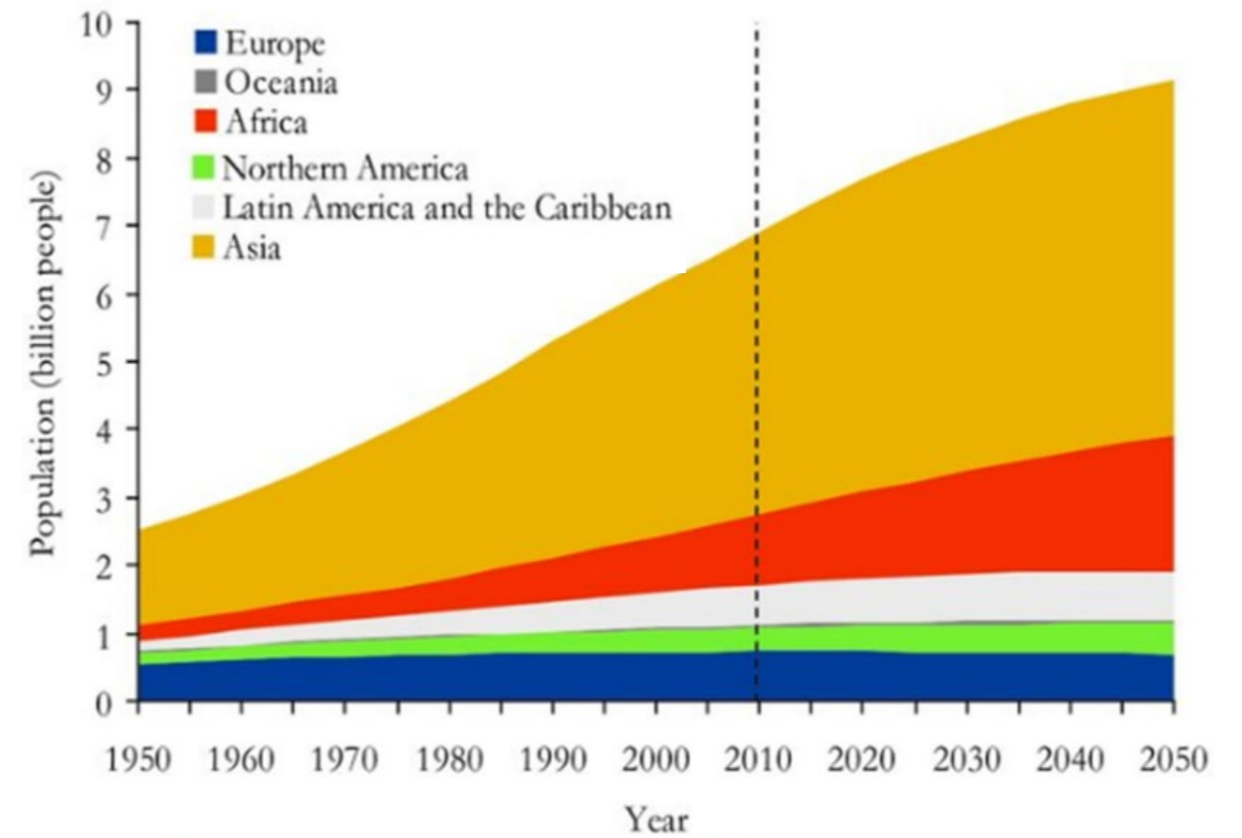


Living in the tropics

The growing urban population in the tropics



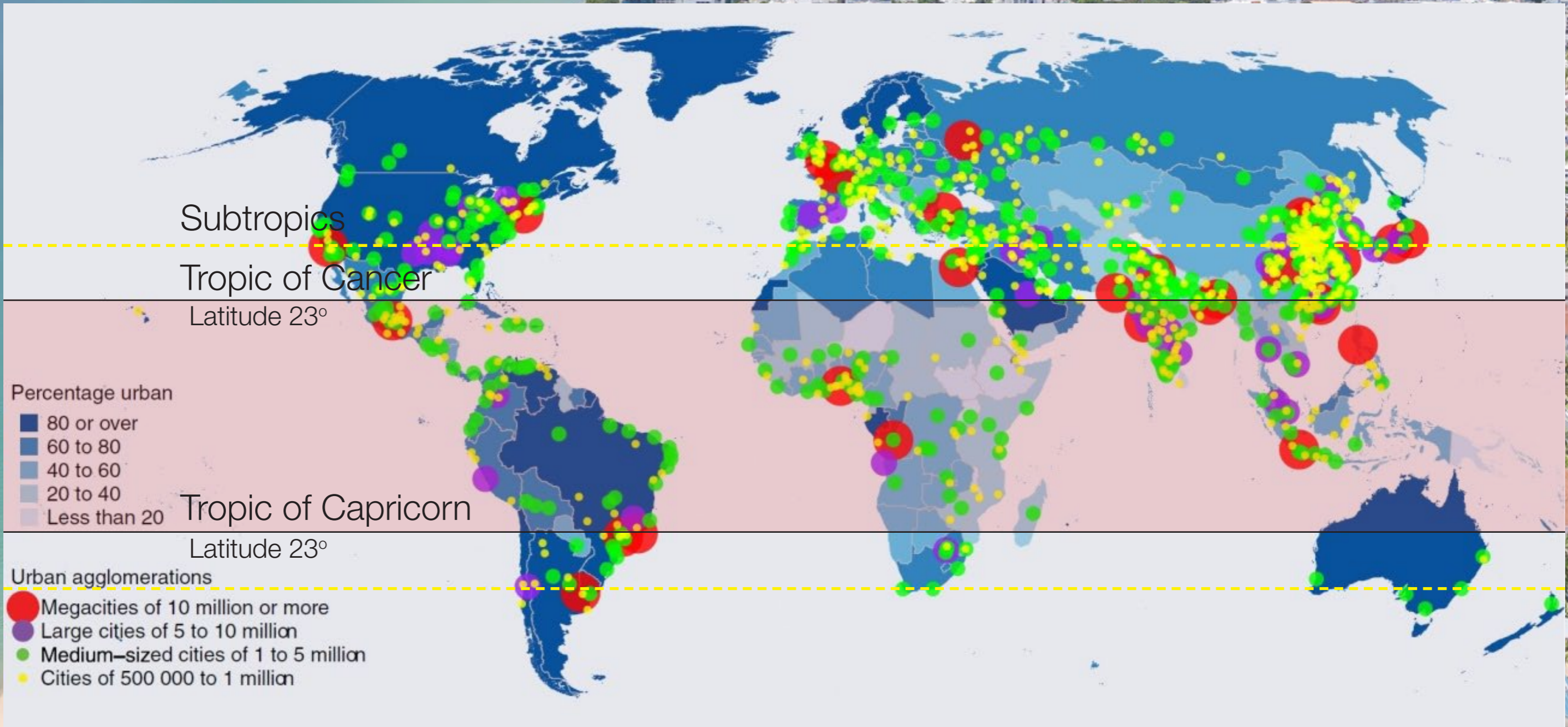
Source: Drawn from World Urbanization Prospects, the 2011 Revision (UN 2012)





Living in the tropics

Tropical Urbanisation



Percentage urban

- 80 or over
- 60 to 80
- 40 to 60
- 20 to 40
- Less than 20

Tropic of Capricorn

Latitude 23°

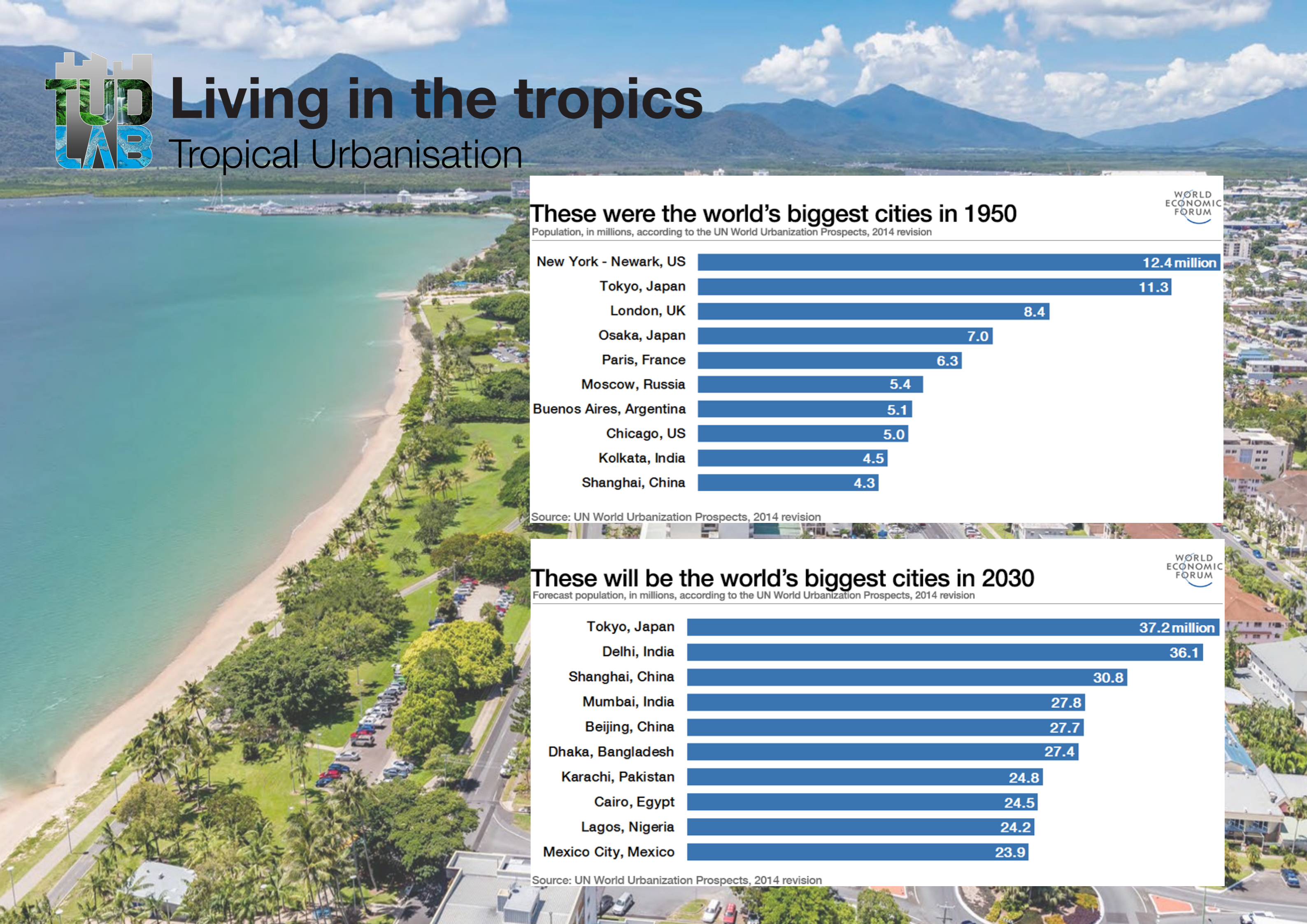
Urban agglomerations

- Megacities of 10 million or more
- Large cities of 5 to 10 million
- Medium-sized cities of 1 to 5 million
- Cities of 500 000 to 1 million



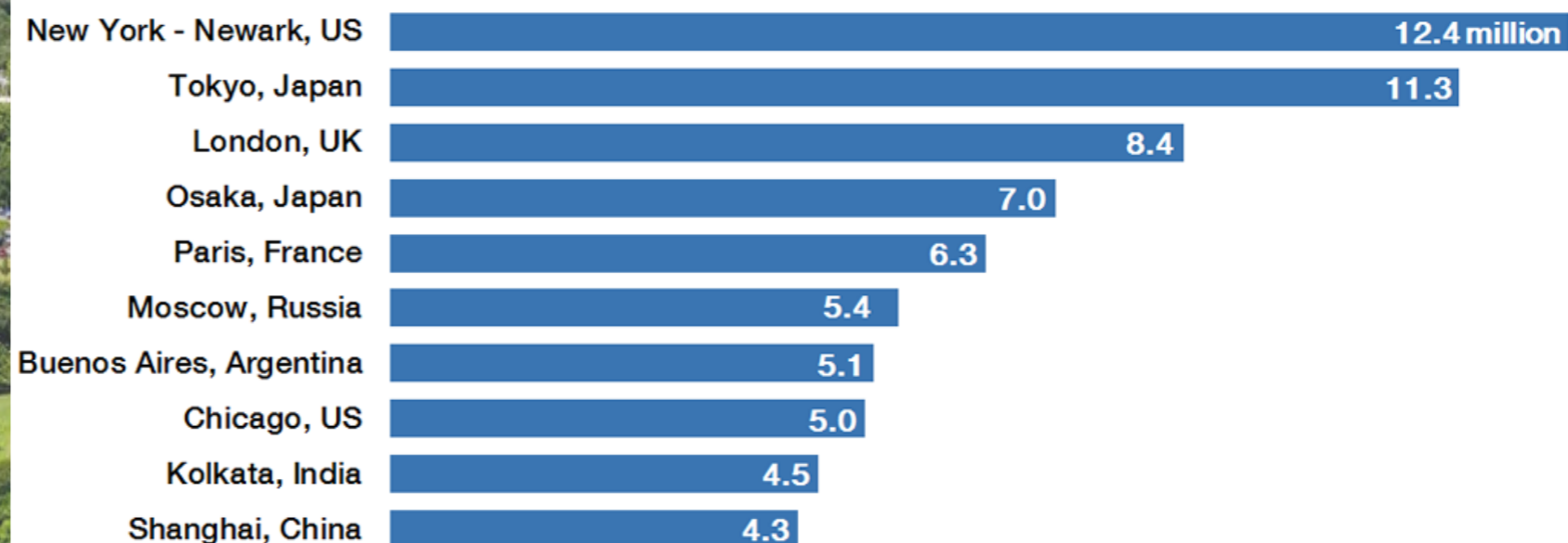
Living in the tropics

Tropical Urbanisation



These were the world's biggest cities in 1950

Population, in millions, according to the UN World Urbanization Prospects, 2014 revision

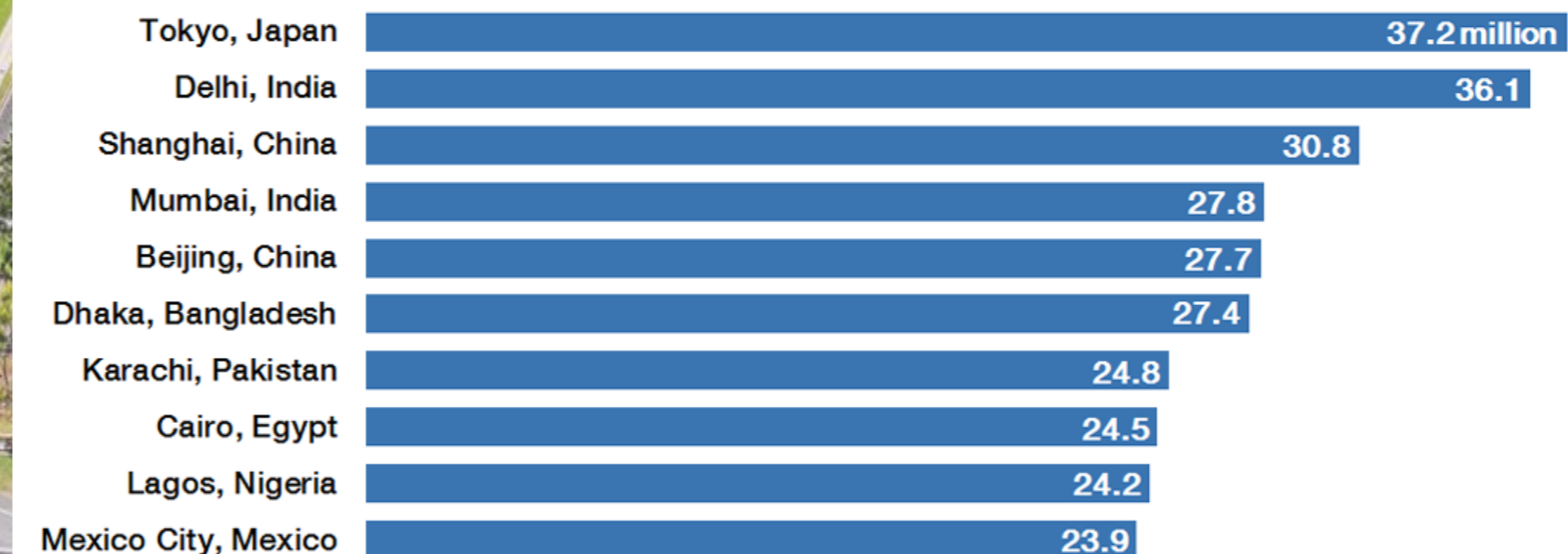


Source: UN World Urbanization Prospects, 2014 revision



These will be the world's biggest cities in 2030

Forecast population, in millions, according to the UN World Urbanization Prospects, 2014 revision



Source: UN World Urbanization Prospects, 2014 revision



Living in the tropics

Northern Australia's tropical cities

- 1 Darwin
- 2 Townsville
- 3 Cairns





Living in the tropics

Cairns, between two world heritage habitats





Urban Water





Urban Water

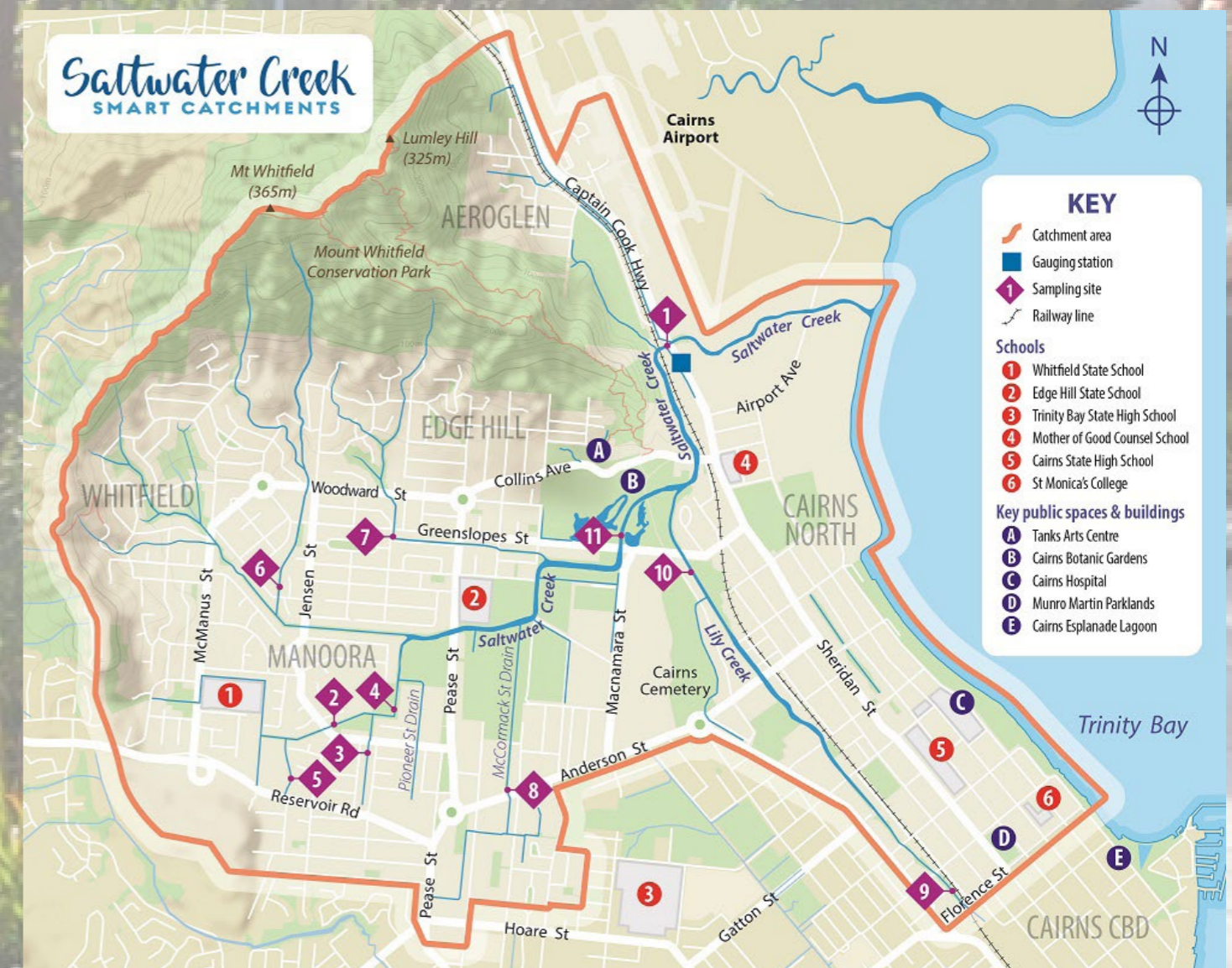
Smart Catchments

Technology to reduce urban environmental impacts on the Great Barrier Reef

Sensors monitoring the quality of water flowing through an urban catchment

Data shared with the community to encourage catchment care

Data to inform future catchment planning for region



<https://www.cairns.qld.gov.au/water-waste-roads/water/smartcatchments/saltwater-creek>



Urban Water

Collaborations

Research

IoT, IT, Geography

Work placements, PhD internships

Curriculum development

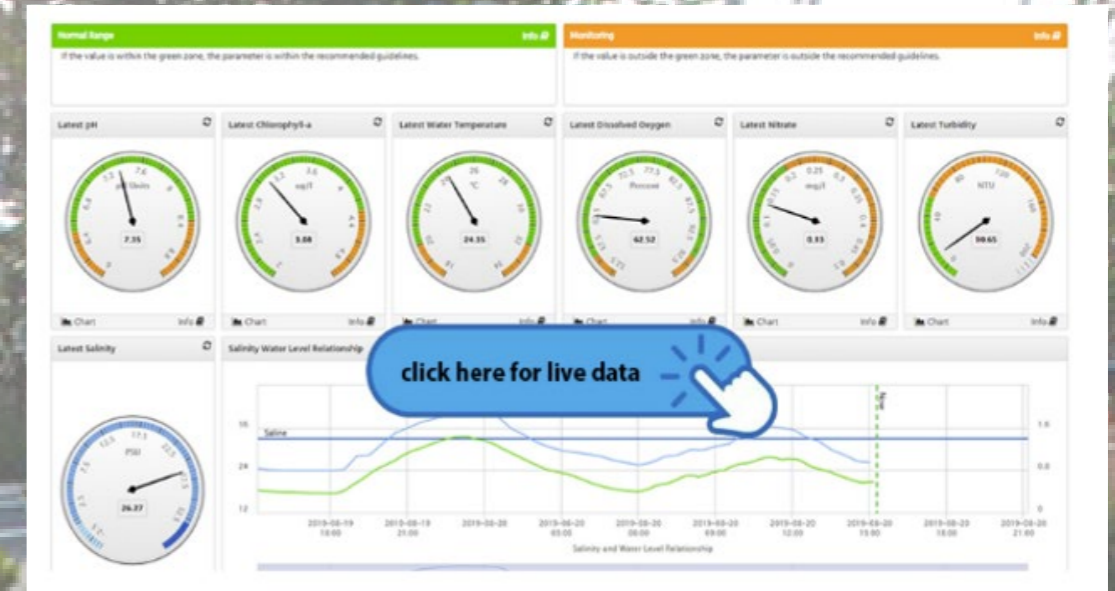
Industry

ITron, startup companies

Government

Council, Federal Government funding,

Healthy waterways partnership



<https:// Cairns-wp.aquaticinformatics.net/Data/Dashboard/1>



<https://www.cairns.qld.gov.au/water-waste-roads/water/smartcatchments/educational-tools>



Urban Water

Smithfield Village, Cairns

Master planned coastal community that adjoins a flood plain

Bio-retention basins, storm water treatment drains, reticulated grey water and a vacuum sewerage system

A number of 'firsts' for regional tropical Australia

One of the Tropical Sustainable Design Case Studies

<https://www.jcu.edu.au/TUDLab/projects/sustainable-urbanism/tropical-sustainable-design-case-studies>





Urban Water

Smithfield Village, Cairns

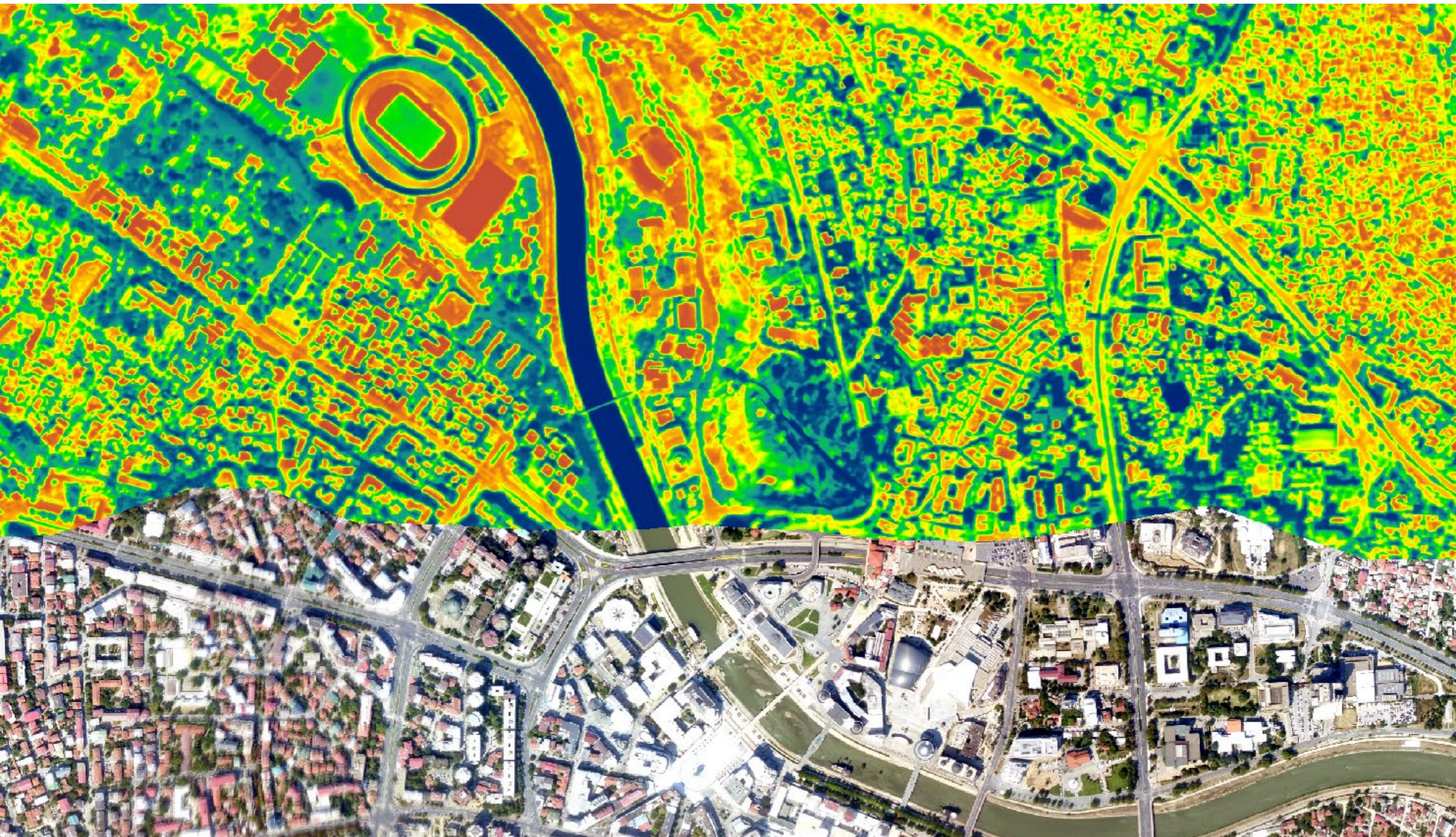
Research
Case study of 'tropical' water sensitive urban design (WSUD)

Sustainable cost benefit analysis of WSUD (recreational space/increasing liveability, environmental protection)





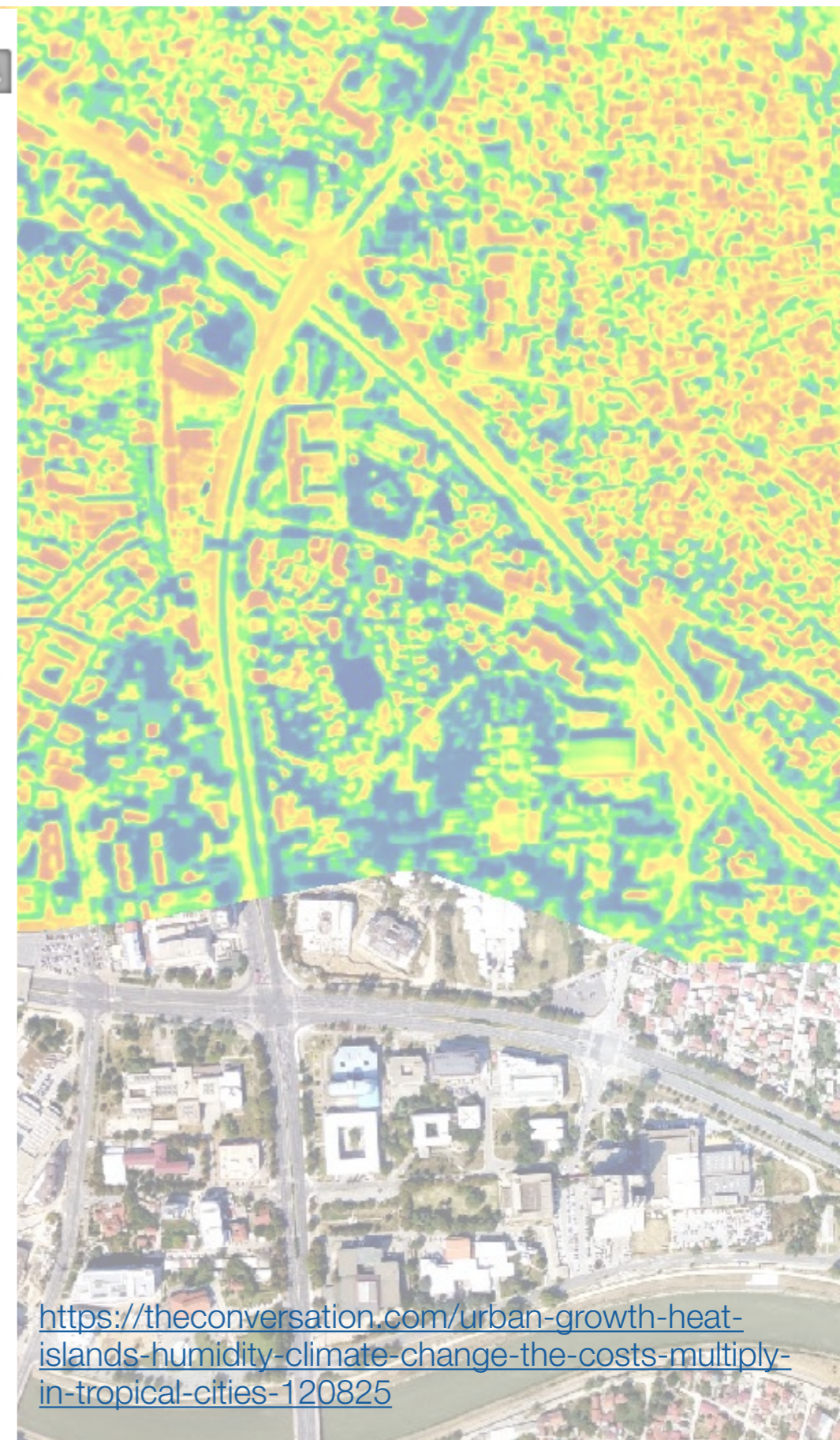
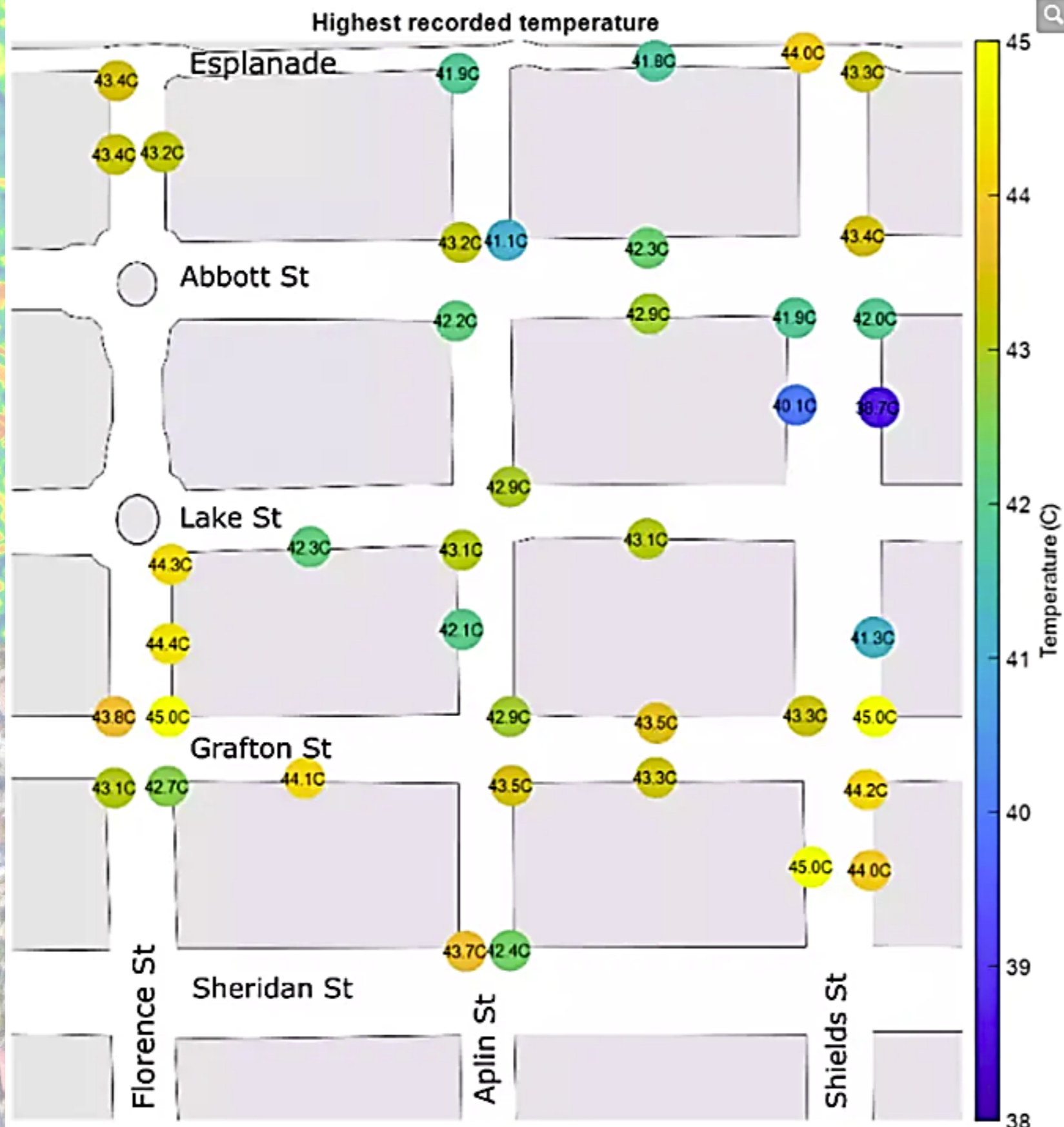
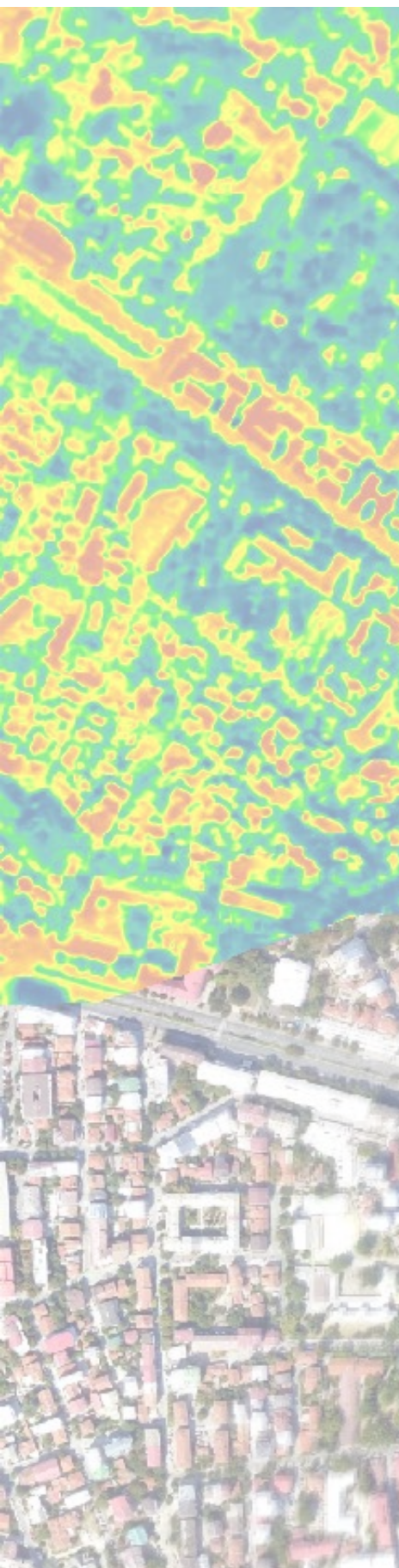
Urban Heat





Urban Heat

Measuring the Cairns urban heat island





Urban Heat

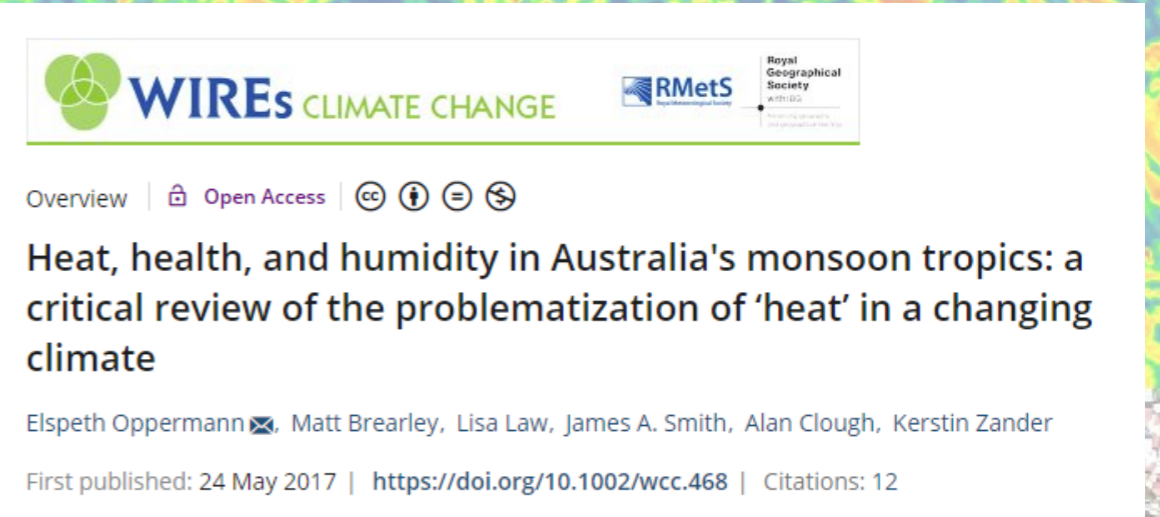
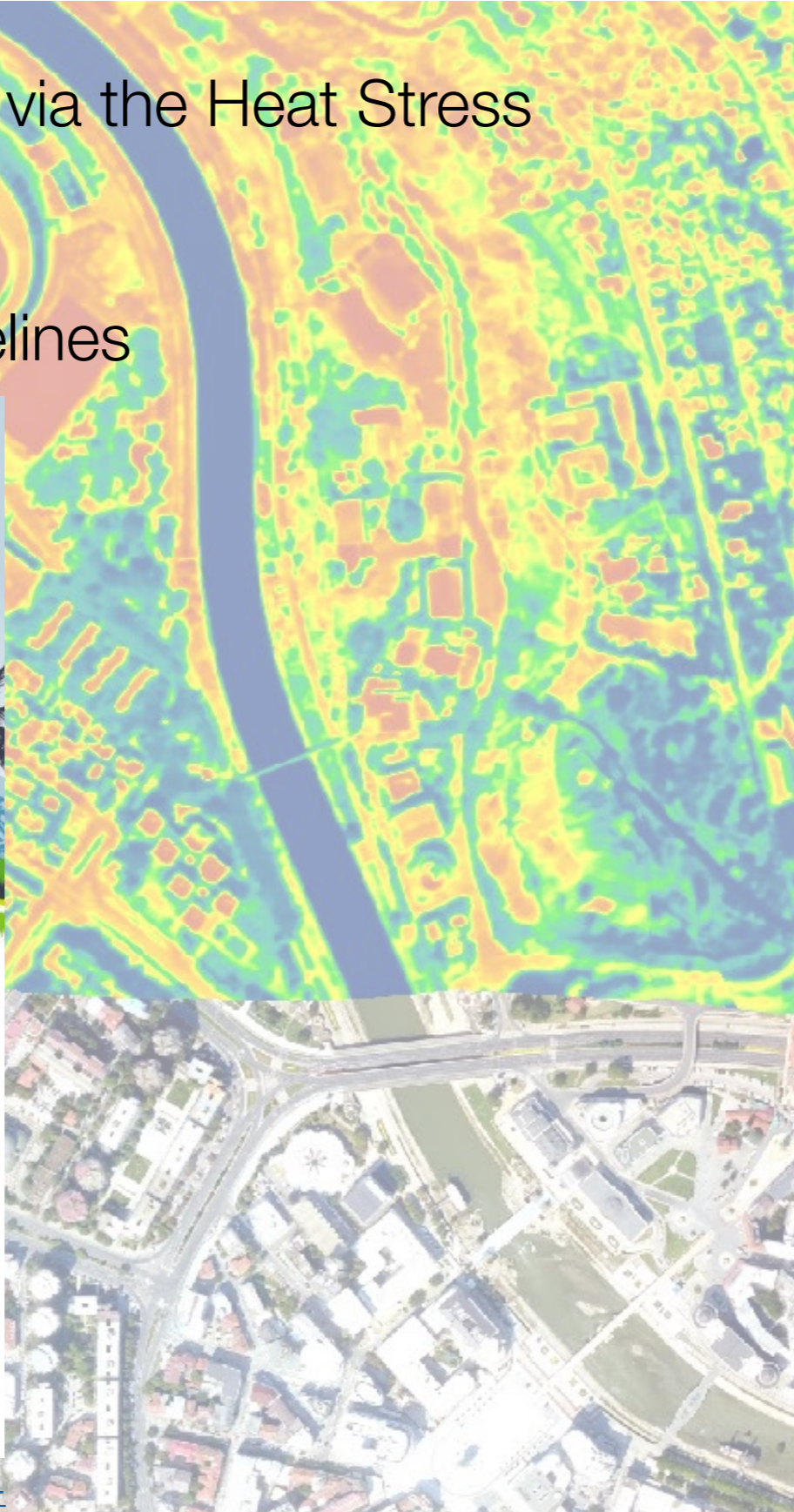
Housing and subdivision design in the tropics

TUDLab/CDU collaboration via the Heat Stress Research Partnership

Cairns Council design guidelines



<https://www.cairns.qld.gov.au/building-planning-business/building/tropical-building>





Urban Green





Urban Green

Cairns City Centre Master Plan: Creating a green and shady city

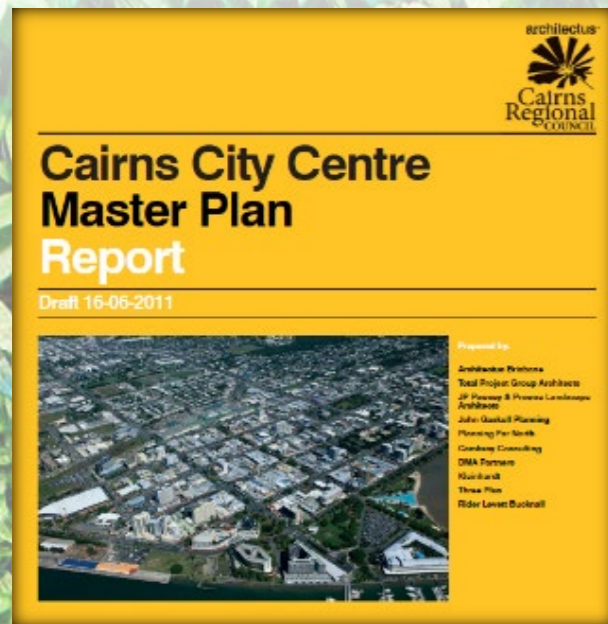


Figure 34. Spectacular Fig Trees, Cairns



Figure 35. Landscape Strategy



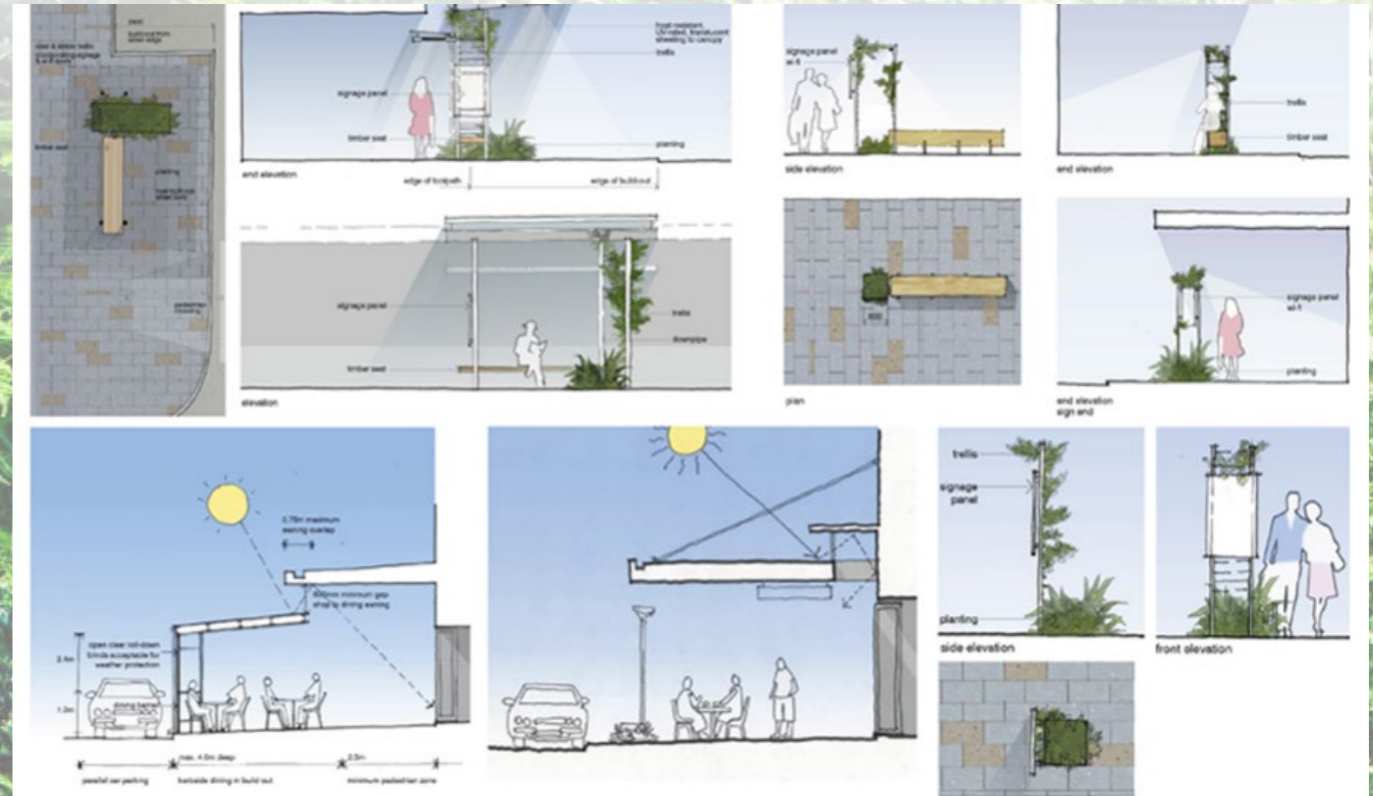


Urban Green



Figure 49. Tropical Urbanism

7.1 Tropical Urbanism; Verandahs, Colonnades, the Green City





Urban Green

CairnsPlan 2016: Shade, Landscaping and Biophilia

Collaborators

TUDLab industry partners, Cairns Regional Council, consultants, Students, James Cook University National planning award from PIA



TROPICAL URBANISM celebrating our tropical identity

Cairns is a world-renowned tropical city with a unique identity and unparalleled natural beauty. We are a "city in the rainforest"; our urban landscape is inextricably linked to our surrounding natural environment. Our lush green corridors of tropical foliage, views of the World Heritage listed rainforest mountain ranges and Great Barrier Reef, and relaxed outdoor living spaces are defining features of Cairns. One of the significant changes to the draft planning scheme is to provide development controls to protect and promote our unique character — a character expressed as "tropical urbanism". The planning scheme will reflect tropical urbanism, whilst ensuring development in Cairns City and North Cairns remains economically viable and practical.



Building height limits & design controls

CAIRNS CITY & NORTH CAIRNS

The current building height restrictions were identified as a major barrier for development in the Cairns City Centre and North Cairns areas. Submissions to the draft planning scheme suggested the current restrictions limit growth, residential and commercial diversity and business opportunities, putting Cairns at an economic disadvantage. In Cairns City and parts of North Cairns, it is proposed to allow buildings to be built to the Obstacle Limitation Surface (OLS - see fact box). This will stimulate new, financially viable development opportunities, promoting economic growth and prosperity. The tropical urbanism design controls will ensure that development respects and enhances the city's unique character. The new height limits will unlock the potential for developers to respond to the growing demand for higher density inner-city living and reduce the pressure to develop new suburban areas to house our growing population. A compact city centre also creates improved efficiencies for infrastructure and public transport. In North Cairns, the proposed planning scheme change sets three different height limits. These heights transition downwards to the west, ensuring development respects the current streetscape and existing low-rise buildings. Refer to the map on Council's website for more detail on these three height limits. In addition, the tropical urbanism design controls will encourage buildings of different heights and scale, with separation between buildings to maintain privacy for residents. A variety of building designs will create visual interest. Lush landscaping will achieve a sense of green space, and buildings will be sited so as to maintain vistas to the Esplanade, ocean and mountains.

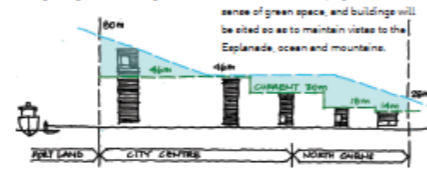


Figure SC6.16.3.8.g – Street canopy (view from inside)

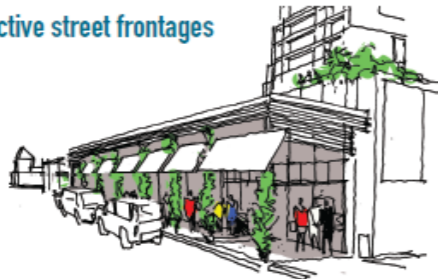


Figure SC6.16.3.8.h – Street canopy (advertising is located on shop fronts)

Street canopy and active street frontages

CAIRNS CITY

One of the signature design elements of tropical urbanism will be the 'street canopy' - an architectural expression of the natural rainforest canopy. Where new or renovated buildings meet the street, footpath frontages will provide a generous canopy - a tall, sheltered public space offering light, shade and breeze. This canopy will create an attractive shaded space on the footpath and improve amenity for building occupants, visually linking the building interior to the street.



Vertical landscaping

CAIRNS CITY & NORTH CAIRNS

Lush green landscaping is a much-loved characteristic of the image of Cairns and an important complement to the city's buildings by providing shade and soft screening. As taller buildings become more prevalent throughout the city, the proposed new planning controls will provide for integrated vertical landscaping to green and promote the tropical characteristic.





Urban Green

Vertical landscaping

CAIRNS REGION PLANNING SCHEME



Figure SC6.16.3.7.a – Vertical landscaping



Figure SC6.16.3.7.d – Example of vertical landscaping in North Cairns



Urban Green

Building height limits

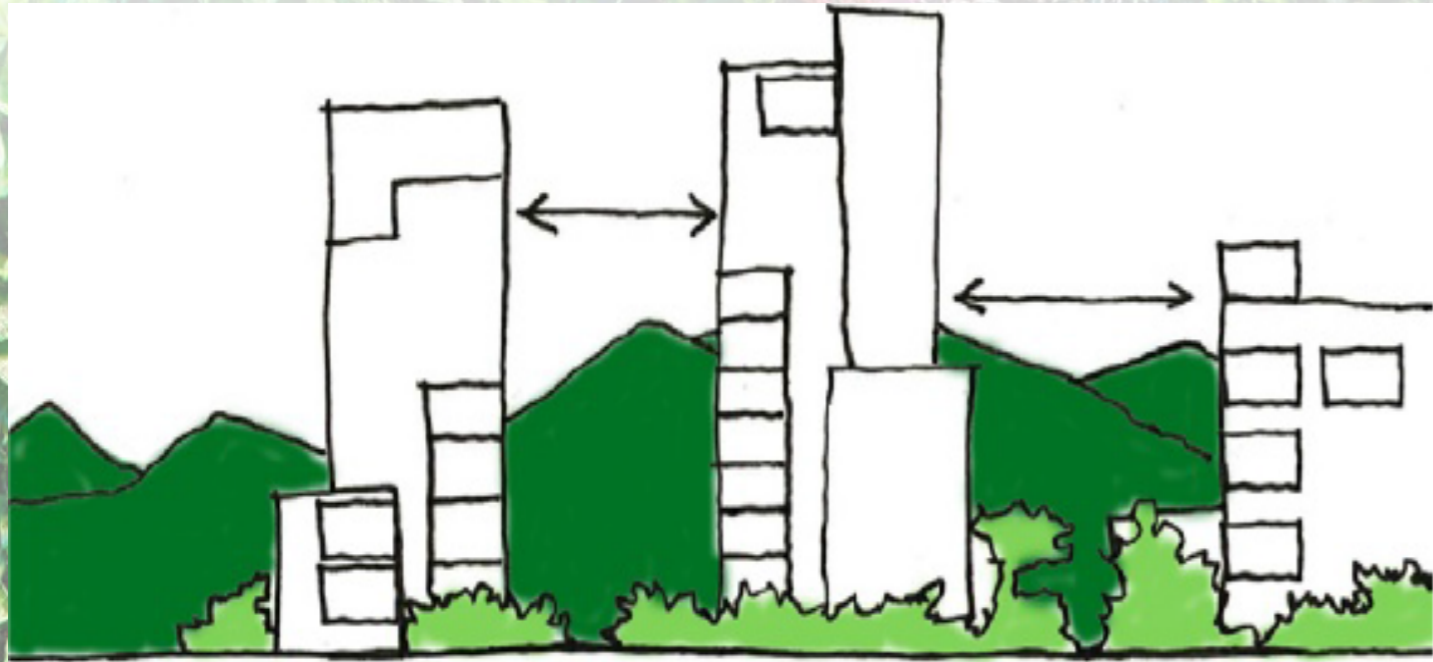


Figure SC6.16.3.2.a – Separation between buildings



Figure SC6.16.3.10.a – Human scale at streetscape level





Cairns as a living laboratory Collaborative opportunities?

