DESIGNING OUR INFRASTRUCTURE FOR A RESILIENT FUTURE

September 2017

sustainablecampus.unimelb.edu.au / ourcampus.unimelb.edu.au

Our future will be hotter, drier, with more extreme weather events

unpredictable
variability

Bushfire prone


Not In Service
261

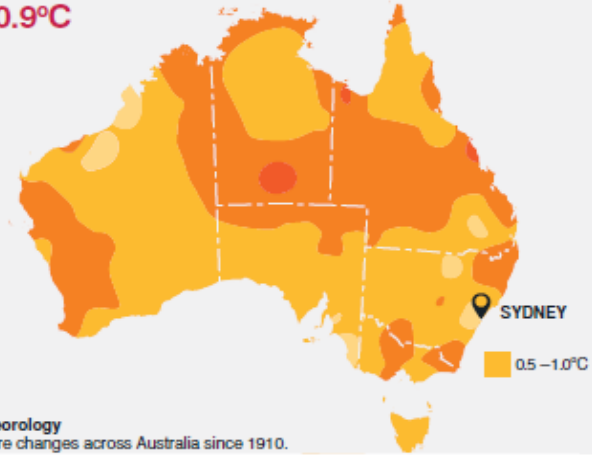
Melbourne swelters through record-breaking overnight temperatures around 30C

Updated 9 Mar 2016, 3:16pm

Australia's mean temperature has **warmed by 0.9°C** since 1910.

TEMPERATURE CHANGE (°C)

2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0

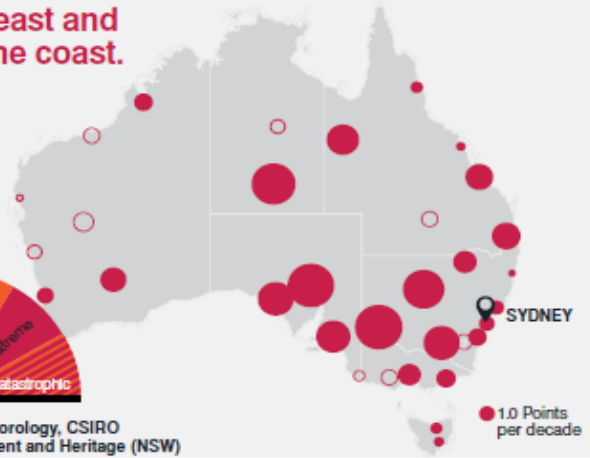


Source: **Bureau of Meteorology**
Annual mean temperature changes across Australia since 1910.

The largest increases in fire weather have been **in the southeast and away from the coast.**

INCREASE DECREASE
(Points per decade)

0.2
0.5
1.0
2.5

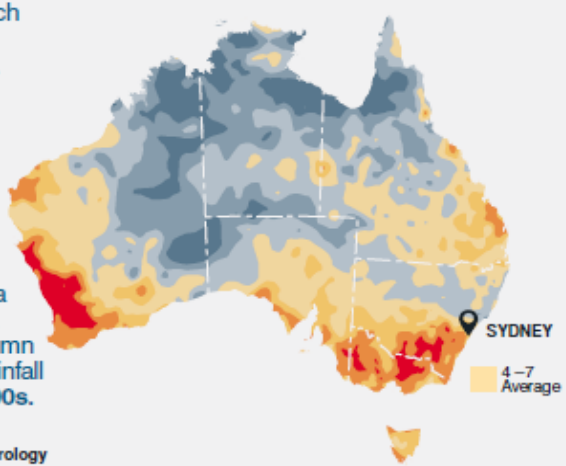


Source: **Bureau of Meteorology, CSIRO and Office of Environment and Heritage (NSW)**

Rainfall in the Southwest of Western Australia has been very much below average to **lowest on record.**

RAINFALL DECILE RANGES

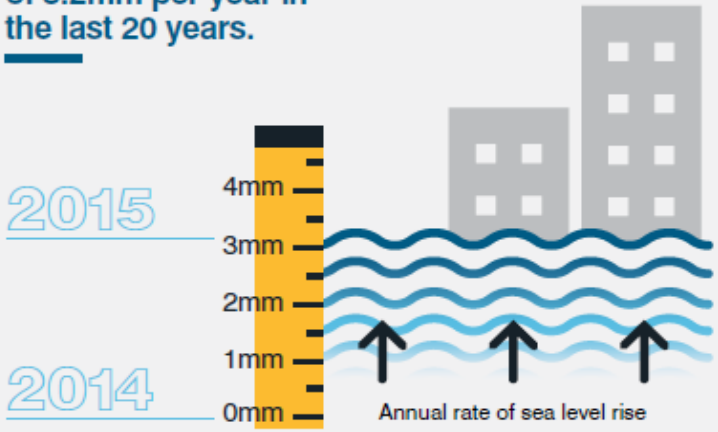
Highest on record
10 very much above average
8-9 above average
4-7 average
2-3 below average
1 very much below average
Lowest on record



Southeast Australia has experienced a decline in late autumn and early winter rainfall **since the mid-1990s.**

Source: **Bureau of Meteorology**

Sea level rose at a rate **of 3.2mm per year in the last 20 years.**



As well as a changing climate, the scale and pace of change is unprecedented

What is Urban Resilience?

*The capacity of individuals, institutions, businesses and systems within a city to **adapt, survive and thrive** no matter what kind of chronic stresses and acute shocks they experience*

Shocks

- Flood
- Heatwave
- Drought
- Marine pollution
- Global economic crisis
- Electricity supply disruption

Stresses

- Unemployment
- Family violence
- Alcohol and drug abuse
- Ageing population
- Increasing social inequality
- Lower rates of community participation

So, what does it mean for a University?

Strategic drivers

Triple Helix

- Research
- Teaching & Learning
- Engagement

Strategic drivers – triple helix

*The Triple Helix metaphor describes the character of the University and the importance of its core activities — **Research, Learning and teaching, and Engagement** programs. These three strands of the helix are **supported and enabled** by our leadership and by our people, **infrastructure**, polices, planning, administration and resources.*

http://about.unimelb.edu.au/strategy-and-leadership

SUSTAINABLE CAMPUS

Our start…

AS 5334 Climate change adaptation for settlements and infrastructure - A risk based approach

green building council australia

6 greenstar

Communities PILOT

THE UNIVERSITY OF MELBOURNE

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Project asset or operation	Extreme temperature	Annual rainfall	Extreme rainfall	Sea level rise + storm surge	Storms (snow, hail, dust, & lightening)	Annual relative humidity	Drought	Extreme wind	Fire danger	Evaporation rates
Building assets										
- Heritage or aging buildings	✓	✓	✓		✓	✓	✓	✓	✓	
- High-performance buildings	✓	✓			✓			✓	✓	
- Non-air-conditioned buildings	✓				✓	✓		✓	✓	
- Buildings housing sensitive research equipment and samples	✓		✓		✓	✓		✓	✓	
Road and pathways	✓	✓	✓		✓		✓			✓
Energy generation / distribution	✓		✓		✓			✓	✓	
Water supply drainage and drainage resources	✓	✓	✓		✓		✓			✓
Waste management	✓		✓		✓			✓		
Communications	✓		✓		✓	✓		✓	✓	
Parks and open spaces	✓	✓	✓		✓	✓	✓	✓	✓	✓

Climate change risk for our buildings

Melbourne Conservatorium of Music

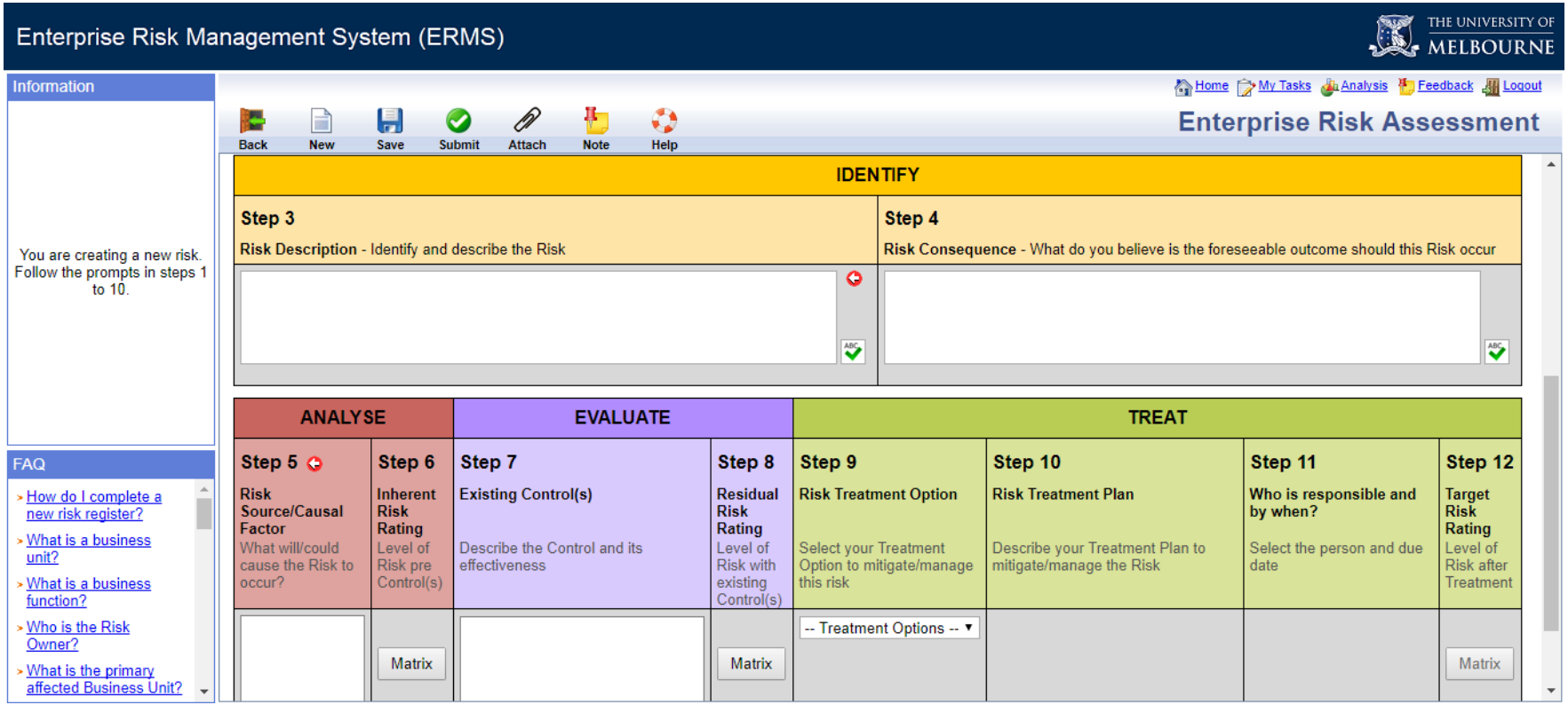
Western Edge Bioscience - North

Lessons learnt so far…

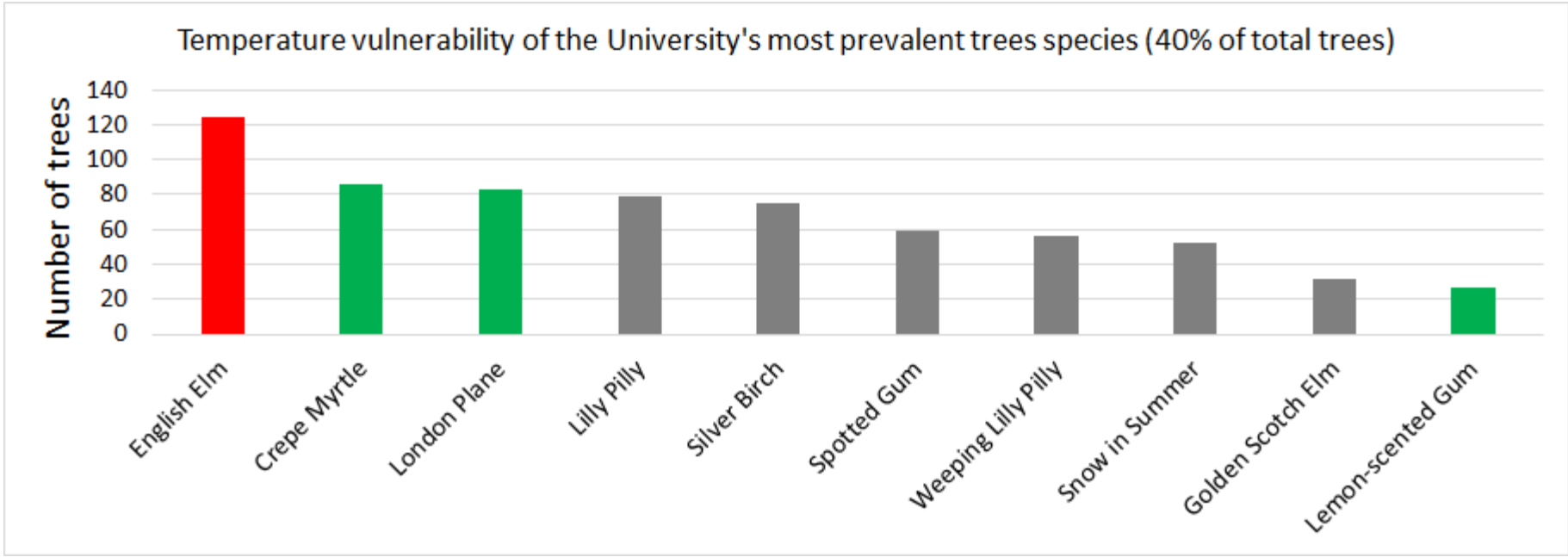
- Main climate impacts identified related to extreme heat and rainfall / storms
- Risk to assets vs risk to operations
- Design considerations seem to be tracked, but handover of risk to UoM asset managers needs improvement
- Need to get better value out of green star adaptation plans

Next steps…

Integrate with Risk Management System



Becoming better informed

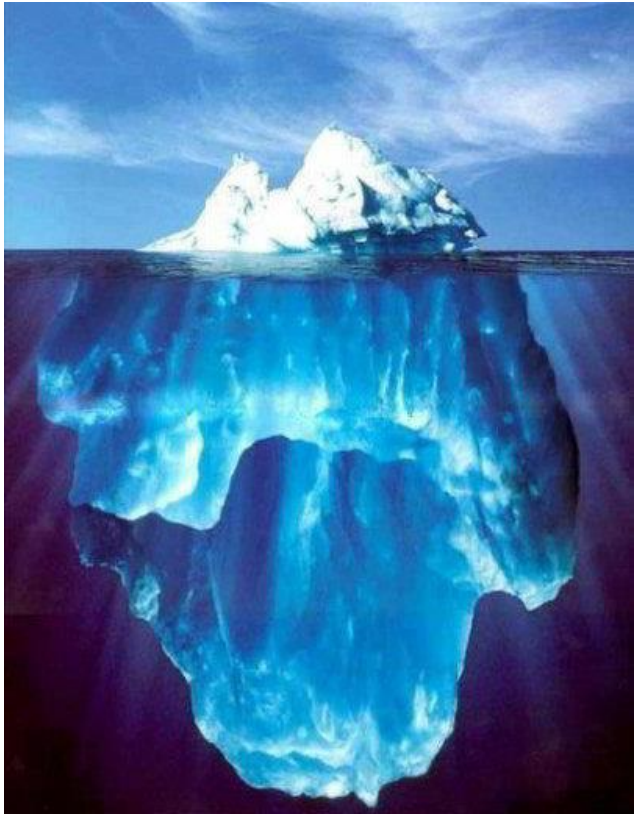


Summary

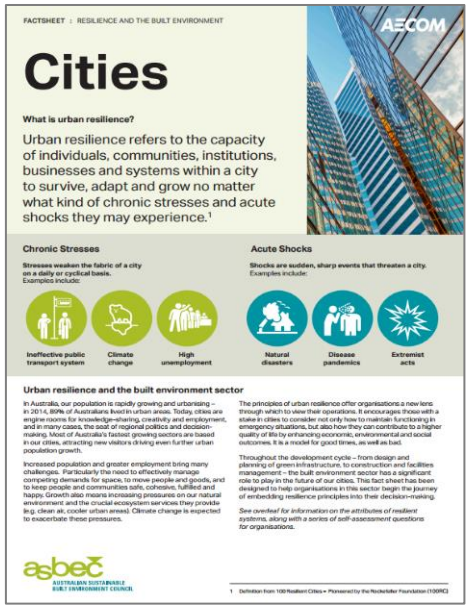
Resilience planning is essential

Resilience not about reducing negative impacts, it is about enhancing positive impacts

Collaboration is fundamental across organisations for successful resilience planning



What can you do?



FACTSHEET : RESILIENCE AND THE BUILT ENVIRONMENT

Cities

What is urban resilience?

Urban resilience refers to the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and grow no matter what kind of chronic stresses and acute shocks they may experience.[1]

Chronic Stresses

Stresses weaken the fabric of a city on a daily or cyclical basis.
Examples include:

Ineffective public transport system · Climate change · High unemployment

Acute Shocks

Shocks are sudden, sharp events that threaten a city.
Examples include:

Natural disasters · Disease pandemics · Extremist acts

Urban resilience and the built environment sector

In Australia, our population is rapidly growing and urbanising – in 2014, 89% of Australians lived in urban areas. Today, cities are engine rooms for knowledge-sharing, creativity and employment, and in many cases, the seat of regional politics and decision-making. Most of Australia's fastest growing sectors are based in our cities, attracting new visitors driving even further urban population growth.

Increased population and greater employment bring many challenges. Particularly the need to effectively manage competing demands for space, to move people and goods, and to keep people and communities safe, cohesive, fulfilled and happy. Growth also means increasing pressures on our natural environment and the crucial ecosystem services they provide (e.g. clean air, cooler urban areas). Climate change is expected to exacerbate these pressures.

The principles of urban resilience offer organisations a new lens through which to view their operations. It encourages those with a stake in cities to consider not only how to maintain functioning in emergency situations, but also how they can contribute to a higher quality of life by enhancing economic, environmental and social outcomes. It is a model for good times, as well as bad.

Throughout the development cycle – from design and planning of green infrastructure, to construction and facilities management – the built environment sector has a significant role to play in the future of our cities. This fact sheet has been designed to help organisations in this sector begin the journey of embedding resilience principles into their decision-making.

See overleaf for information on the attributes of resilient systems, along with a series of self-assessment questions for organisations.

asbec AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

1 Definition from 100 Resilient Cities – Pioneered by the Rockefeller Foundation (100RC)

FACTSHEET : RESILIENCE AND THE BUILT ENVIRONMENT

Infrastructure

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Urban resilience and our critical infrastructure

Most Australians are accustomed to a high level of service from our critical infrastructure, such as utilities, transport networks and the healthcare system. Particularly in cities, rapid population growth is putting these expectations to the test, requiring significant investment from governments with constrained access to capital. Addressing this will require a broader conversation about funding models, as well as more interconnected and multipurpose infrastructure.

Natural disasters add to these pressures – the Australian Business Roundtable for Disaster Resilience and Safer Communities estimates that $17 billion will be spent on rebuilding critical infrastructure after natural disasters by 2050. This figure does not take into account other emerging risks to our critical infrastructure, such as cyber-attacks and extremist acts. Climate change also imposes a greater uncertainty over future infrastructure investment decisions, requiring a new model for decision-making.

What we think of as critical infrastructure is also changing. Rapid advancements in technology mean broadband is rapidly outmoding landline telephones. We are increasingly realising the importance of our natural assets and the ecosystem services they provide. These shifts provide a major opportunity to improve the wellbeing of all Australians, especially those who were left behind by our old models of service delivery.

The principles of urban resilience offer organisations a new lens through which to view their operations and realise these opportunities. It encourages those with a stake in critical infrastructure to consider not only how to maintain functioning in emergency situations, but also to focus on how services they deliver can contribute to a higher quality of life by enhancing economic, environmental and social outcomes. It is a model for good times, as well as bad.

Throughout the development cycle – from design and planning, to construction, operation and decommissioning – the critical infrastructure sector has a significant role to play in the future of our cities. This fact sheet has been designed to help organisations in this sector begin the journey.

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FACTSHEET : RESILIENCE AND THE BUILT ENVIRONMENT

Housing

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Urban resilience and the housing sector

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Increasing urban populations bring many challenges for housing. Affordability is a major issue – in 2011, the shortage of dwellings for low to medium income households was estimated at 211,000 nationally. With competing demands for space, a related challenge is providing housing close to fulfilling employment, essential services, recreational opportunities and sustainable modes of transport. Climate change is expected to exacerbate existing environmental challenges – quality housing stock will be crucial in a future of more frequent and intense extreme events, such as heatwaves and floods, especially among the most vulnerable members of society.

The principles of urban resilience offer organisations a new lens through which to view their operations. In the housing sector, it can help organisations consider not only how their places and services can support residents in emergency situations, but also how they can contribute to a higher quality of life by enhancing economic, environmental and social outcomes. It is a model for good times, as well as bad.

Throughout the development cycle – from design and planning to construction and facilities management – the housing sector has a significant role to play in the future of our cities. This fact sheet has been designed to help organisations in this sector begin the journey.

See overleaf for information on the attributes of resilient systems, along with a series of self-assessment questions for organisations.

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www.asbec.asn.au/research-items/factsheet-resilience-built-environment/

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