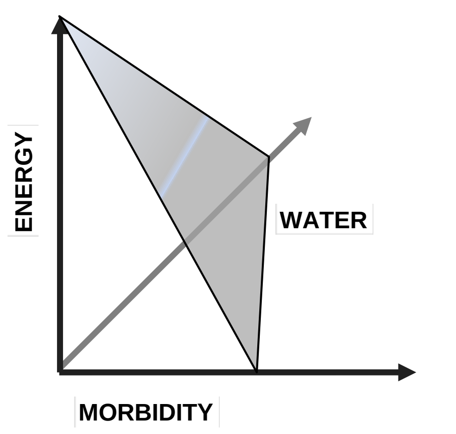
RP2005

HEATWAVE-RESILIENT BUILT ENVIRONMENT

Research Questions

- How can we assess urban heatwave resilience?
- What are the main drivers and barriers to heatwave resilience?
- What aspects should be considered in building design & retrofitting guidelines to ensure both heatwave resilience and energy efficiency?

Figure 1: The impact indicators of heatwave resilience



Methodology

Time series analysis and regression analysis were used to explore the interplay between heatwave intensity and different impact indicators (Figure 1) in Adelaide and Sydney. The model developed in this analysis helped to devise the framework of heatwave resilience.

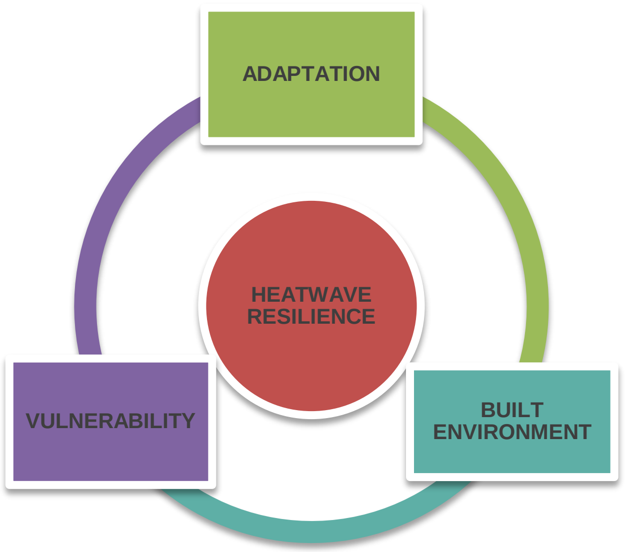
To explore the drivers and barriers to heatwave resilience, an online survey was conducted with a representative sample in Adelaide. The level of population vulnerability, adaptation and the relevant characteristics of the built environment were explored (Figure 2).

To demonstrate the difference between energy efficient and heatwave-resilient built environment a typical, Australian residential building will be modelled with AccuRate. The model will illuminate the difference between heatwave-resilient and energy efficient design & retrofitting features.

Results

The excess heat factor (EHF), a new metric devised by the Bureau of Meteorology, was found to be a better indicator of excess morbidity than daily maximum temperature in Adelaide but not of excess water and energy consumption. Although the magnitude of excess water and energy consumption, and heatwave-related health issues are interconnected, EHF cannot be used to link them (Figure 3).

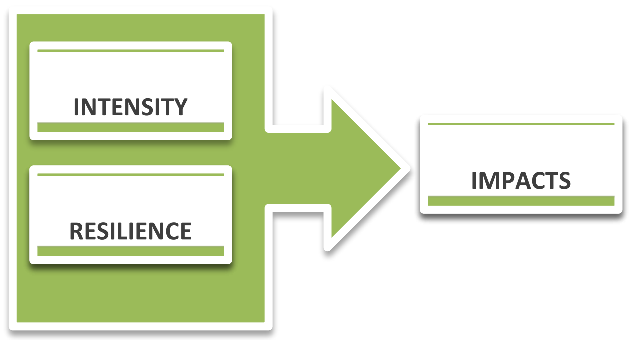
Figure 2: The elements of heatwave resilience



The results of the online survey about heatwave resilience (Figure 3) demonstrated that:

- heatwave-resilience has a triply advantageous impact on the level of adaptation, energy use and public health
- different social groups use significantly different adaptation techniques
- air-conditioning decreases the level of passive adaptation
- tenants live in less resilient homes than homeowners.

Figure 3: The interplay of heatwave intensity, resilience and impacts



The analysis of the energy simulation model is in progress.

Conclusions

The EHF can be used as a sophisticated indicator of heatwave-related morbidity in Adelaide. Further studies are warranted in other climatic regions.

An integrated measurement and implementation of urban heatwave resilience in future heatwave policies is crucial.

The aspect of heatwave-resilience has to be introduced in design & retrofitting policies beyond energy efficiency.

Anticipated impacts

Heatwave resilience has to be implemented both in building design & retrofitting.

- The EHF can be implemented to trigger heatwave plans in Adelaide.
- Future research, and policy changes related to heatwave resilience should connect the silos of public health, energy and water management.
- Building codes should integrate requirements related to heatwave resilience not just energy efficiency. (A parallel research project funded by the ABCB is ongoing).
- The effectivity of heatwave communications could be increased by adapting them for different social groups.

Further information

http://www.lowcarbonlivingcrc.com.au/research/program-2-low-carbon-precincts/rp2005-urban-micro-climates
http://www.urbanclimates.org

Contact

Gertrud Hatvani-Kovacs

University of South Australia

E: gertrud.hatvani-kovacs@mymail.unisa.edu.au