WESTERN SYDNEY
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Institute for Culture
and Society

Cooling the Commons

Pilot Research Report

OCTOBER 2016

The *Cooling the Commons* Pilot Research Report has been prepared by members of the Mapping Urban Resilience in Riverland Sydney (MURRS) research group at Western Sydney University. This research was supported by funds from the Cities and Economies Research Theme at the Institute for Culture and Society, Western Sydney University.

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ACKNOWLEDGEMENTS

We would like to thank the residents of Western Sydney who participated in this study as members of three focus groups for their time and generous inputs. We would also like to thank Karen Brown at St Marys Corner Community and Cultural Precinct, Suzy Baker and Linda Wilson at Nepean Area Disabilities Organisation (NADO) and Carolyn Gilbert at Koolyangarra Aboriginal Child & Family Centre, Cranebrook, for helping us to organise our information sessions and focus groups, and for their general interest in and support of our research. We are grateful to Jen Guice, Carmel Hamilton, Bernadette Riad and Fiona Plesman from Penrith City Council for edifying discussions about urban heat in Western Sydney, advice about the recruitment of participants, and for their encouragement to undertake this research. We would like to acknowledge the important contributions of MURRS member Kaye Shumack in developing our commoning research agenda. Finally, we would like to thank Stephen Healy and the Cities and Economies Research Theme for the seed funding that supported this research, and Emily-Kate Ringle Harris of the ICS for assistance with the cover design.

Cover photograph by Katherine Gibson 2014

COOLING THE COMMONS: EXECUTIVE SUMMARY

This pilot study provides initial insights into how residents living in Western Sydney keep cool during the hottest parts of the year and how they would like to see their living environments, at home and out and about, modified to improve wellbeing in a climate changing world. The research responds to the lack of qualitative information about: day to day living practices in outer suburban Sydney; the constraints people experience when trying to keep cool; and, people's aspirations for more comfortable living environments.

The study reviewed factors that combine to produce urban heating in Sydney's rapidly developing urban fringe and the key socio-environmental issues that researchers have identified as important. These include the health effects of periods of extreme heat and the loss of shading and cooling effects as the tree canopy is further degraded. Our research highlighted the dearth of information about how residents move around in space and interact with the physical environment and in turn how the changing built environment on the urban fringe is shaping new forms of individual and social behaviour.

The pilot research was designed to observe and listen for social and collective practices and adaptations to environmental stress, as well as individual ones. To this end we employed the concept of the 'cool commons' to identify those spaces that offer cooler temperatures than surrounding areas and that are used by, and are accessible to, a community of commoners who to some degree, care for, take responsibility for, and benefit from this coolness. Our working hypothesis was that if we can identify effective and environmentally resilient ways that communities are already keeping cool, urban design and public policy might be better placed to support this grassroots adaptation and experimentation.

Cooling the Commons conducted focus group discussions with a range of residents across hotspots in Western Sydney, in particular Penrith, Cranebrook and St Marys. Previous research commissioned by Penrith City Council had highlighted these hotspots where land surface temperatures often exceed 45 degrees Celsius in summer months and where low-income households are concentrated.

The report finds that older people employ a range of creative practices in their largely un-airconditioned homes to cool down, while younger people and those with disabilities resort to curtailing their physical activity. There is a high degree of appreciation of the **residual cool commons**, that is, those cool spaces that are a legacy of past actions of tree planting or restrictions on river shore occupation, or of past skills and practices of cooling that may or may not have been maintained.

A further finding is that people are drawn to the **transgressive cool commons** that have been produced by acts that are illegal or not condoned, such as occupying 'private' air-conditioned spaces for extended periods of time (in shopping centres, McDonalds or community centres) or use of water features for play.

The most important finding, and the one that could guide future action research, is that there is a strong **aspirational cool commons**, that is, what people would like to see as

constituting a cool commons in their environments. In our data, aspirational commons were linked to the provision of basic cooling amenities (shade, shelter, water) coupled with the provision of paths and walkways. They were also linked to improved access to water play, parks and pools.

Our findings show that shade, shelter and water commons are desired for a cool future city. Built and social interventions are needed to promote urban green space and encourage its use. However it is not a case of 'build it and they will come' or 'regulate and they will behave'. Normative social practices that have grown up around current conditions, such as children playing indoors for large parts of the day, will be difficult to budge, and require action in relation to both the built and social environment on an ongoing basis. It is critical for the communities directly affected to design such interventions – such is the nature of a commons. We found participants were interested in volunteering ideas for a future cool city. There is potential to expand this in a meaningful way by taking a co-design approach to further research.

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> *All this multi-development – high density units – we are all going to be in a hot dome – the heat is just going to sit on top of us!! ...we need housing but they are not thinking about how to do it.* (W1, Carers [Group 2])

1. INTRODUCTION

Cooling the Commons is a pilot research project funded through the Cities and Economies Research Theme (CERT) at the Institute for Culture and Society (ICS). This pilot study explored how residents across hotspots in Western Sydney, in particular Penrith, Cranebrook and St Marys, cope with the heat during the summer months. The study grew out of discussions with Penrith City Council who had previously contracted research through the University of Technology, Sydney to document urban ambient temperatures in summer throughout the local government area (LGA). That research highlighted several hotspots where land surface temperatures exceed 45 degrees Celsius. These are also areas with the greatest concentration of low-income households, a convergence that reflects a national trend (Penrith City Council 2015, p.11). Council is using this data to frame a policy and plan regarding urban cooling, including strategic tree planting and installation of rain gardens in roundabouts and street verges. Council is also interested in identifying communities where issues such as lower household incomes or reduced mobility might impact residents' opportunities to cool their homes and neighbourhoods, or to access cooler areas of the LGA during heat events. This research responds to the need for action related to community education and engagement about cooling, identified in Penrith City Council's (2015) *Cooling the City Strategy*.

Urban heat is emerging as a major liveability issue for Western Sydney's future. While there is a significant body of quantitative literature on the impacts of urban heat (some of which we review in this report) and many studies that identify key design considerations related to retrofitting cities to ameliorate these impacts, such as increasing green space and tree canopy cover, water sensitive urban design, and green roofs and walls (Hopkins & Goodwin 2011; VCCCAR 2012; Jacobs et al 2014), there are few studies that address the sociocultural contexts that may inhibit or support cooling strategies in Western Sydney or that "make space for individual agency" to focus on salutogenic (health-giving) opportunities (Bell et al 2014). The sociocultural context is particularly relevant because cooling the city is closely related to the experiences and actions of people. For example, the best design intentions can be undone or blocked by human actions, or innovation, and imagination in the latter can ameliorate the need for the former, or propel design innovation further.

This study therefore aimed to learn more about how people experience the impacts of summer heat, to explore how

residents of Western Sydney may act to create cool and comfortable environments for themselves, and to generate preliminary findings about how best to leverage citizen participation in sustainable cooling strategies. Our preliminary findings reveal 'cooling' as a complex socio-cultural as well as biophysical issue, and support the need for further qualitative research to contribute to the knowledge base about social resilience in Western Sydney in the broader context of a climate-changed future.

2. WESTERN SYDNEY: A CONTESTED LANDSCAPE WITH A RAPIDLY DEVELOPING URBAN FRINGE

There are a number of key, interrelated issues affecting Western Sydney that appear to be compounding the heat vulnerability of people and places.

Decline in Rural Areas Associated with Food Production

The region has for some time experienced a decline in food production, particularly since the 1970s when turf farms in the fertile flood plains of the Hawkesbury region were reclassified as agriculture (Miller et al 2005). Planning strategies from the *Cities of Cities* metropolitan plan 2005 onward, rezoned previous 'greenbelt' lands in Western Sydney as 'urban capable'. These lands contain some of the most productive soils in the nation (Gilbert 2007). Recent research voices a range of concerns about the uncontained development of housing and infrastructure in Western Sydney, and raises important questions about how Sydney will feed itself in the future (Sydney Food Futures 2015). Conversion of agricultural lands to housing and infrastructure has implications for local heat dynamics. Of course it is not the loss of just agricultural land, but also loss of bushland and biodiversity that has considerable social and environmental impacts.

Water Scarcity, Soil Degradation, Urban Heat Island Challenges

Western Sydney is facing specific climate change challenges including water scarcity, soil degradation and urban heat island effect resulting from the replacement of vegetation with heat-absorbent surfaces. Western Sydney is not reached by the cooling sea breezes associated with coastal cities, and can be 10 degrees hotter than the Sydney's harbourside Central Business District (WSROC 2008; Hopkins & Goodwin 2011; Jacobs nd); a situation that is likely to grow worse in the future due to the differential impacts of climate change (WSROC 2008; DIICCSRTE 2013; Brown 2012).

Grass-bare Ground, Hard Surfaces and Reduction in Tree Canopy

A recent report that looked at urban tree canopy rates in Australia from an LGA perspective, found that while Sydney has the second highest proportion of hard surface overall (second only to Melbourne in a national assessment), Western Sydney has the highest proportion of grass-bare ground in NSW, with Blacktown, Camden, Fairfield, Liverpool and Penrith all boasting significant areas of potentially plantable space (Jacobs et al 2014a, p.26). [1]

[1] That Report identifies the importance of making a distinction between different forms of urban 'green cover' such as grass and bare ground (including residential lawns, sport fields and sites cleared for development), shrubs and trees, in order to identify the proportions of each, 'plantability', and opportunities for future design innovation (Jacobs et al 2014, p.5). It is important to note that green space is often

Whilst grass-bare ground can be considered a form of 'urban green space' and is better than hard concrete surfaces in terms of managing ground temperature and storm water, and reducing the build-up of urban heat (Jacobs et al 2014, p.39), it does little on its own to increase the amenity of open public environments. Indeed, in research by Penrith City Council and Western Sydney University exploring open public space and cultural context, Western Sydney parklands were described by a young male participant involved in the study as 'fields of nothingness'; featureless environments to drive through rather than to use (Sofoulis et al 2008, p.40).

That study on public open space identified that people require shade of various sorts as well as other basic amenities such as water fountains, seating and toilets in order to use and move through open spaces comfortably and, importantly, to perceive these spaces as useable and 'liveable' (Sofoulis et al 2008). This is further borne out in research linking green space to public health and well-being where upgraded and visibly maintained parks are perceived to be safer and are more likely to be visited (Hunter et al 2015, p. 251-2).

Lack of Public Transport Infrastructure

A lack of public transport infrastructure, including bus shelters, linking people to parks, shops, and facilities such as swimming pools, is another challenge inhibiting the ability of people to get about comfortably in Western Sydney.[2] For example, local teenagers from one suburb with very low socioeconomic indicators made a submission to Council requesting that a shuttle service to the regional pool be provided – the local bus company had stopped driving in their suburb due to acts of vandalism by teenagers, leaving no public transport options. Subsequently the teenagers had started swimming in the water features of an adjacent higher-income suburb on hot days, which raised substantial health and safety concerns as the features were not designed as swimming spaces and contain numerous hazards. In our own primary research (see 5.*What we found: social research findings*) women in Group 3 reported that in certain areas of Penrith it is too hot to walk in the streets or push infants in strollers during the summer months.

The Character of New Housing Developments

As a focused 'Urban Growth Area', Penrith has experienced significant loss of trees where new housing developments have occurred. Apart from clearing the sites to achieve economic feasibility, development guidelines include reduced street widths and block sizes (http://www.urbangrowth.nsw.gov.au).

As a result, new developments have narrow easements for only small street trees, significantly reduced areas for residential gardens, and nearly

treated more generically in research linking it to public health and wellbeing.

[2] The Climate Adapted People Shelter project is exploring the design of bus shelters with increasing urban heat in mind: https://ulab.org.au/caps-climate-adapted-people-shelter/

contiguous roofs (for example, see Figure 1 below).

Figure 1. Jordan Springs Development, Penrith.
Photo: Helen Armstrong, Dec 2015

The speed, linearity, and character of Western Sydney's development means that the ratio of grass-bare ground to hard surface is rapidly changing as the image of Lendlease's Jordan Springs from October 2009 to May 2016 shows (Fig 2). Verbs like 'surge', 'transform', and 'strengthen' are used liberally in promotional material to describe the development of Penrith LGA as an economic force to be reckoned with and fertile ground for future investment. While an example such as Jordan Springs fits into this rhetoric and stands as a measure of the economic health of development in the West, it also suggests that there is perhaps, a missing narrative about the impact of such progress on the everyday lives of people in new and existing communities: *How does rapid urban development impact on the liveability of urban environments and the capacity of communities to participate in them?*

Figure 2. Jordan Springs surges: e-newsletter from Penrith City Council Invest in New West June 17, 2016.
Source: http://us8.campaign-archive2.com/?u=6932ec05d6fb7f24f0ef2b86b&id=7e2c73258a&e=7bc7327e71

3. ENVIRONMENTS IN WHICH PEOPLE LIVE MATTER TO THEIR HEALTH AND WELLBEING

Socio-environmental Issues

The effects of extreme heat on liveability have received recent research attention. The Climate Commission's *The Critical Decade: New South Wales Climate Impacts and Opportunities* (Steffen & Hughes 2012, p.10) reports as follows:

> *Periods of extreme hot weather can lead to an increase in mortality, especially in the elderly (Kjellstrom and Weaver, 2009). A study of emergency hospital admissions in five regions in NSW – Sydney East and West, Illawarra, Gosford-Wyong and Newcastle – showed that on extremely hot days there was an increase in heat related injuries such as dehydration. Those with existing conditions such as cardiac and respiratory diseases, and mental health problems, are more susceptible to heat-related injury and death (Khalaj et al., 2010). Workers at risk from exposure to extreme heat include those who work outdoors, such as construction workers and builders; maintenance workers; farmers and emergency and essential service providers* (Hanna et al., 2011).

Benchmarking Australia's Urban Tree canopy: an i-Tree assessment Final Report (2014) points to the amenity of tree cover as an important factor in physical and psychological health of communities (Jacobs et al 2014, p.4). There is a direct correlation in the research between greener neighbourhoods, lower 'sitting time', and the likelihood and frequency of moderate physical activity such as walking, which has known health benefits (Astell-Burt et al 2014). However, the assumption that green space *necessarily* leads to these health benefits is not borne out in the research.

Studies that examined features of existing urban green space showed that various sorts of interventions into the physical environment coupled with programs encouraging physical activity (such as scheduled activities, mediated promotions, and various renovations to public spaces such as maps and signage), are required (Astell-Burt et al, 2014b; Hunter et al 2015). In addition, studies indicate the importance of both the *social* and physical environment in encouraging physical activity. Hunter et al (2015) remark "There is a need to move beyond individual level approaches and toward broader population interventions that provide a supportive social and built environment" and a number of questions such as "What role does the social environment play in the uptake, initiation and maintenance of physical activity behaviour change in urban green space?" remain to be answered (p.254).

Cool Commons in Western Sydney

A key dimension of our research therefore concerns *the social environment*. Drawing on Gibson-Graham et al (2013) we use the term 'commons' to refer to that which is made, cared for, and shared by a community, including biophysical resources, material infrastructures, socio-cultural practices, and knowledges (p. 130). Some, but not all, publically owned space and infrastructure operates as a commons. What distinguishes a commons is the active process of 'commoning' which involves establishing rules or protocols for access and use, taking care of and accepting responsibility for a resource and distributing its benefits widely (Gibson & Shumack, 2014). Commoning can take place with any form of property, from privately owned, publically owned, and open access property. For example, community facilities such as seasonal public pools owned by the local government are commoned by users who make the pool part of the social fabric of a community (Rossiter 2015, p.28). The atmosphere, which is an open access resource, is currently the focus of failed attempts to care for its accelerated warming. However, successful international efforts to clean air and combat ozone depletion give some indication of what has been, and potentially can be, done to common the atmosphere (Gibson-Graham, Cameron & Healy, 2016). In this project we were interested to explore how people experiencing extreme heat cared for themselves and sought out cooler air, and to what extent we could identify forms of cool commoning in Western Sydney.

Accessibility and Amenity for Cool Commons

Making and sharing a commons requires accessibility that is challenged in various ways by the environmental issues and development activities we have thus far described, which represent significant dynamics of change across Western Sydney's 'hotspots'. The local teenagers who could no longer access the regional swimming pool because the local bus company had stopped driving in their suburb due to acts of vandalism (by teenagers), took action to access the water features of an adjacent higher-income suburb on hot days. To some, this would appear to be further vandalism, to others a form of guerilla commoning. *As this act shows, commoning can be inventive and transgressive.*

Sofoulis et al's (2008) study found that the mall and fast food restaurants are major sites of recreation in Western Sydney, and children identified play structures associated with MacDonald's as the 'park' (p.39). Such environments are, of course, commercial and characterized by private ownership and the exclusions that this entails. Nonetheless, the report concludes that such normative influences and shifts are due in large part to the availability of both amenity (air conditioning, toilets) and society in those environments, which are often not available in the traditional outdoor park.

A third example relates to members of the Aboriginal community in Cranebrook, who migrate to the air-conditioned community centre when it gets too hot in their poorly designed homes. Along with public pools, these sites are commoned by users seeking coolth during hot weather. *For us this points to accessibility as a key and*

complex socio-cultural issue in the development of cool commons in Western Sydney.

Design Strategies for Cool Commons

Invariably, the body of literature we have examined specifies a need for further qualitative research into the relationship between biophysical environmental change, built environments and human health and well-being. The i-Tree assessment study positions itself as part of "a process to catalyse social change in Australia's urban areas" and indicates the need for a strategic approach to improving tree cover to manage urban heat (Jacobs et al 2014, p. 37). Other studies detail design strategies to mitigate increasing urban temperature, for example the Greencover Demonstration Project Liverpool City Centre and Penrith (2011) prepared by the NSW Government Architect's Office, which underscores the importance of the designed environment to enhance community resilience and the capacity of local government to respond to the heat effects of climate change. However, these top down design strategies will only be successful if there is grass roots involvement by concerned citizens and buy-in from powerful institutional actors such as urban developers.[3]

[3] A preliminary review by the MURRS research group of 'cultural barriers to greening' of Australian cities, points to the interaction of many different cultures—including that of developers and development oriented Councils, as well as of different generations of overseas settlers. Further research is needed into the legacies of overlaying cultural valuing and devaluing of vegetation, starting with Anglos in the 19th century who had little appreciation of native plants and trees nor of the care that Indigenous commoners had put into its 'park-like' appearance, up to more recent migrant settlers who display a variety of attitudes to urban green space.

Community Attitudes to Cool Commons

To this end, we underscore the importance of community perception and practice in understanding the social and cultural dimensions inhibiting and promoting cool commons. Indeed, in the discussions with Penrith City Council preceding this project, staff reported public antipathy towards trees due to issues such as mess and potential danger (e.g., from falling branches). This antipathy has been flagged by Council as particularly strong in Western Sydney and a potential barrier to developing policy or implementing plans focused on increasing green cover or street plantings.

Another question for further research therefore emerges here: *what sorts of commoning practices are people interested in investing their time and energy in?*

Figure 3. Anzac Parade, Sydney May 2016.
Residents protest the removal of century-old fig trees. Photo: Helen Armstrong

Figure 4. Perfectly finished. A front garden in Claremont Meadows exemplifies aesthetic preferences for low shrubs and bare, manicured lawns and represents a significant investment of time and energy. Photo: Abby Mellick Lopes

4. *Cooling the Commons* Research Strategy: the Pilot Study

What we did: methodology

This pilot asked *how do residents of Penrith, Cranebrook and St Marys keep cool during the summer months?* This simple question was posed in recognition of the importance of people and their practices in the creation of a cooler city. Through this preliminary investigation, we sought to both capture a sample of these missing qualitative data, and to provide some clues as to how best to facilitate cooling strategies for the benefit of the communities most severely affected by summer heat. The proposed research was to conduct home visits so people could show and tell us about their cooling strategies, and to visit local sites of social and recreational activity.

Approach

Rather than focusing on individual 'behaviours' we focused on social practices: recursive 'ways of doing and saying' (Schatzki, 1996) that offer a more nuanced picture of how everyday routines are held in place by assemblages of materials, meanings and skills (Pantzar & Shove 2010). Social practice theories demand a closer look at the everyday context as a dynamic site of social and material conditions that are mobilised through embodied patterns of social 'performance' (Schatzki, 1996; Reckwitz, 2002a, p.251). Previous Australian research using social practice theory to analyse cooling practices has highlighted inherent contradictions and tensions in current policies that focus on 'technical' or 'behavioural' strategies (Strengers and Maller, 2011). In real terms this approach means that a participant who might talk about problems in 'pramming it' to the local park or community centre is understood as drawing not on a one-off experience, but a pattern of repeated activity that depends on physical infrastructure and equipment (pram, footpath, water bottles, hats, appropriate clothing and footwear, and so on) and the positive or negative meanings associated with the activity (for example, is it likely there will be others at the park to chat and play with?). We also looked for slippages in meaning, such as the migration of 'park' to the air-conditioned indoors in Sofoulis et al's study (2008). Such shifts in meaning become embedded as social practices grow up around them, a fact which has complex implications for 'social change'.

Our methodology involved site analyses, photographic documentation, and recorded semi-structured individual and group interviews. The interview data was analysed thematically, drawing on the reviewed literature and the visual data collected during site visits. We analysed this body of data for what it could tell us about people's cooling practices, the cool commons they were accessing or participating in, and emerging problems and opportunities experienced by people in their efforts to keep cool.

We sought to capture not only what participants could show or tell about what they do, but also the less conscious or 'tacit' dimensions of practical activity, as "we know more than we can tell" (Polanyi 2009, p.18). We also attended to the physical environments in which activities took place and how these

activities were resourced. In contrast to semi-structured interviews which encourage people to share their experiences, stories, motivations, and intentions, photographic documentation and site notes can reveal less-than-conscious aspects of the 'sociotechnical' assemblage of people and things—or in the language of sociotechnical theory, human and non-human 'actors' (Latour 2005). Non-human actors such as baths, hoses or shade cloths can't be said to 'determine' actions but instead "authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid and so on" (2005, p.72), thereby facilitating or curtailing human creativity. Through the combination of interview and photographic documentation, we sought to provide an appropriately nuanced picture of cooling strategies and existing cool commons.

We wanted to talk to a range of participants including parents/non-parents, single/partnered people, those who are working, retired or unemployed. We were particularly interested in hearing from those most vulnerable to heat stress, including parents with young children, those with physical challenges, and the elderly. Gender balance was desirable but not considered essential for this pilot project. It is important to note that given the strength of the evidence in support of the need for cooling strategies, a large part of this pilot was to trial the methodology itself to determine whether our approach was the best way to engage communities around these issues, or whether other, more effective approaches emerged in the process.

Locations

Initially we identified three research sites from the heat mapping commissioned by Penrith City Council (see figure below), Glenmore Park, Kingswood (Penrith), and St. Marys.

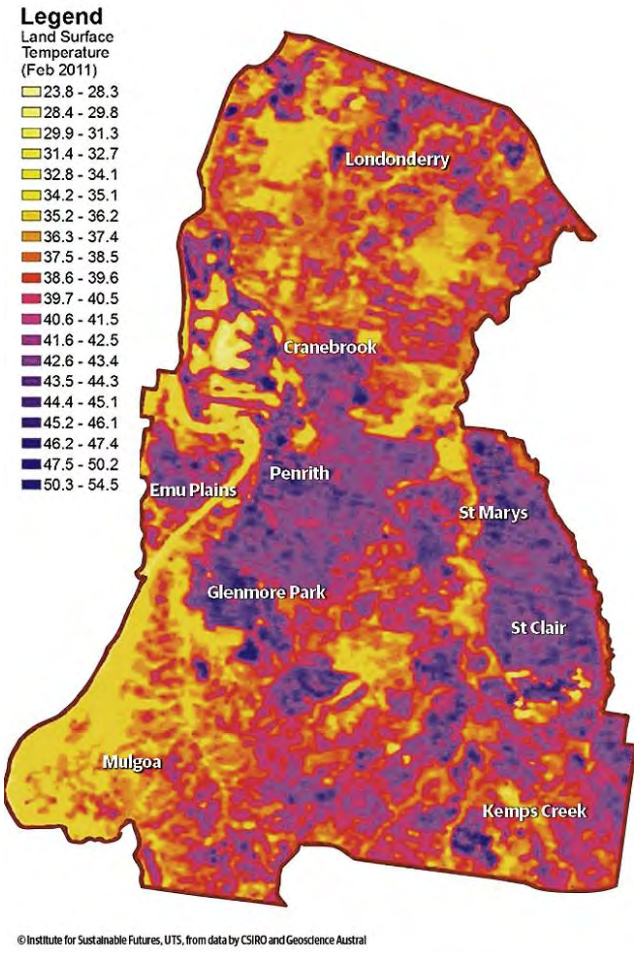

Figure 5. Penrith Heat Map published in the Daily Telegraph on May 24 and commissioned as part of Penrith City Council's *Cooling the City* strategy.

We created an extensive contact list of community centres and services in order to recruit participants for the pilot, and organised our first field trip to visit and photograph our sites, meet and greet our contacts, and drop off recruitment posters so these could be circulated to their clients (see Appendix [i] for recruitment materials).

Through this first field trip, we made a number of discoveries that caused us to question the difference between quantified heat measures and 'real feel' heat (particularly in Glenmore Park where the community centre is located on a cooling tree-lined creek).

Figure 6. Glenmore Park
Photo: Helen Armstrong December 2015

After preliminary and very rich conversations with community centre and childcare staff in Cranebrook, we decided to shift our research site there, as it seemed a more fruitful access point. It was also close to the new release housing estate Jordan Springs, which allowed us to consider the important question of the impact of development on existing communities. This site was still within the range of Penrith LGA hotspots identified in the research.

Participants

During the recruitment process we encountered several barriers to organising the intended home visits. Both Group 2 and 3 were happy to speak to us in a group context, but the service providers advised that home visits would likely be impractical or uncomfortable for participants. In response, we presented the option of a home visit, but did not make it the primary goal of the sessions. Individuals did express interest in the home visits, however for the purposes of the pilot the group conversations provided us with enough initial data and so we decided not to pursue this part of the original plan.

Through the recruitment process, we organised three information/data collection sessions as follows:

Group and contact	**Site and date of visit**	**Participant demographics**
1. Penrith Seniors Centre Group Contact: Karen Brown	St Marys Corner Community and Cultural precinct Corner Mamre Rd and Great Western Highway St Marys. Feb 23, 2016.	14 women, all from Kingswood and St Marys, all aged 55 plus. Economically disadvantaged. Some are members of local historical societies.
2. NADO (Nepean Area Disabilities Organisation) Contacts: Suzy Baker and Linda Wilson	NADO 26 Gidley St St Marys. March 29, 2016	7 women (including 1 person with a disability + carer) and 3 men from Kingswood and St Marys. All aged 55 plus. All carers of daughters/sons with disabilities aged 21-61 years.
3. Aboriginal supported playgroup Contact: Carolyn Gilbert	Koolyangarra Aboriginal Child & Family Centre. 1 Kington Place, Cranebrook. April 1, 2016	10 Aboriginal and/or Torres Strait islander mothers with children under 5 years of age from Cranebrook and surrounding areas. 10 support staff (women) in attendance.

The first two groups were set up as focus groups, though more participants turned up to the first group than anticipated. The interview questions were used as a guide to generate moderated conversations (see Appendix [ii] for schedule of interview questions). Focus groups explored cooling strategies and sought to learn more about the perceived antipathy toward trees highlighted in discussion with council, to consider how this might specifically be addressed. Discussion with Group 1 focused on attendees' cooling practices, including their memories of keeping cool when younger. Group 2 were shown images of local trees in the introduction.

Figure 7. Group 3: Meeting with mothers and carers.
Photo: Helen Armstrong, April, 2016

Figure 8. Group 3: Creative mapping trial
Photo: Helen Armstrong April 2016

With Group 3 we trialed a creative mapping process and a prototype visual tree index (Tree Sheets) to help participants identify and share their feelings about local trees (see Appendix [iii] for samples of Tree Sheets). Though our contact was looking forward to us sharing this 'fun exercise' with the children, the children were too young to understand what a map was but enjoyed drawing and placing stickers. Some of the Support Staff helped with the mapping, which enabled us to talk with them informally. They included occupational therapists, speech therapists, a midwife, and childcare and community workers. The Group 3 mothers were interviewed individually as they played with their children.

5. WHAT WE FOUND: SOCIAL RESEARCH FINDINGS

The key findings from our interview data are presented for each group and according to the relevance of four emerging themes:

1. What participants did at home to keep cool **(strategies at home);**
2. The perceived and experienced **amenity of public environments;**
3. **Tree stories** and;
4. Perceptions of what a **cool future city** should or could be.

Note: For each group we identify participants as either W (woman) or M (man) followed by a number to represent individuals in the group.

Group 1: Penrith Seniors

> *At the moment my electricity bill is $2.74 a day and I run a pool for 4 hours and keep all the powerpoints off. So if I feel I need to use electricity I know, and don't feel like I'm not going to be able to pay the bill.* (W1, Group 1)

This group of 14 women aged 55 + from Kingswood and St Marys were keenly aware of the costs of keeping cool. They practiced a variety of cooling strategies around the home and had effective ways of micromanaging their energy use. Four of the participants in Group 1 kept private pools. They also had clear views about cooling the city beyond their own back fences, and conveyed a strong, even entrenched perception of not being listened to or being left out of decision-making processes affecting their city: "they don't listen to 'we the people' "(W1).

Figure 9. Penrith Seniors Group Photo: Helen Armstrong February 2016

Strategies at home

Water, air conditioning, refrigeration, curtains, canvas awnings, sprinklers, doors, baths, blinds, shutters, sheets, towels, and facecloths are essential resources for keeping cool at home. Participants discussed wetting and hanging or draping material, or freezing water in cake tins and blowing cold air over them as cooling strategies. Reflecting on raising her own kids in the 70s, one participant remembered that "we'd put a wet sheet over the table, the (baby box) under the table and put a fan on it to keep the baby cool." Another strategy was wetting wrists and ankles and wearing wet wristbands "that's (another reason) why we need public bubblers" (W2, Group 1). Many of the group recalled playing under sprinklers, but said they would never do that now. They were unsure about the current state of water restrictions, but perceived the use of potable water in toilets as a 'waste'.

Many of the cooling strategies practiced by this group were to accommodate poorly oriented housing; as one

participant joked “you can’t change your house around” (W1). The majority had sliding rather than sash windows, which don’t allow for the top part to be opened so hot air can escape. It was noted that many older Housing Commission houses have tin roofs and may lack insulation. People discussed keeping their homes dark and closed up during the hot part of the day, with drawn curtains and closed doors. One participant remembered people covering their west-facing windows with brown paper, which would become unsightly as it peeled off the surface of the window. At night people used ceiling fans if they had them, and kept windows open.

Participants commented on a generational change – that their children all had air conditioning and were ‘less tolerant’ to heat than they were. They also commented about a general deskilling in the younger generation, with young adults ‘not knowing’ how to fix a leaky tap or change a fuse. “Our fathers and mothers taught us” (W1). There was a great respect for air conditioning, but it was treated as a finite resource and part of a general power-aware dwelling: “I have rules … it has to be at least 30 degrees – usually my body can tell me. The other day it was 34 degrees before I turned it on… as soon as it starts to cool down, we turn it off” (W4). This awareness was a source of pride. Group 1 also had clear opinions about the design of new housing such as Jordan Springs, and had noted the use of dark bricks and Colourbond roofing, a lack of eaves, small gutters and downpipes and a lack of space between houses for drafts to circulate. “It looks like a prison camp!” exclaimed one participant (W1), who also noted “50-80% of houses in the Penrith area have no insulation.” Participants in this group felt too old to benefit from investing in solar panels and lithium batteries because it could take 20 years to get the saving benefit; “most of us here, we won’t work off that investment - only the young ones can be self-sufficient” (W3). However many spoke of the advantages of roof ventilators (‘whirlybirds’), which were seen as effective at drawing out hot air. They liked that they could buy these at Bunnings and install them themselves on roof hips.

The Amenity of Public Environments

Some participants enjoyed going to air-conditioned clubs; some talked about sitting in the river (in the past) and walking along ‘mulberry tree walk’ at Tench reserve. “Tench reserve is really beautiful and we’re lucky to have it” (W3). Where possible, some participants ‘escaped’ to the mountains. However as the conversation moved to public environments in Penrith, a real sense of resentment crept in about lack of public amenities such as seating, shade, water, and toilets, with many stories about bubblers, trees, and seating being removed. The removal of plane trees in St Mary’s was a hot topic, which seemed to have exacerbated participants’ feelings of being left out of decision-making. While these trees are being replaced, it was noted that 20 years of shade and growth would be lost. There were complaints also about the replacement of terracotta tiles with “grey laundry tiles” (W2), which in participants’ experience were hot, slippery in the rain, and not wearing well.

Shopping centres also came under fire. “You have to go to the ‘shopping box’ to

keep cool", explained one participant (W1). However "elderly people need to sit and they took all that seating out – they don't want you sitting in the walkways, untidying the place up." She explained that this forces people to sit in coffee shops and spend money. Similarly, lack of access to free, clean, and cool water was a keenly felt problem. At Penrith Station "you have to go into the toilet to get a drink" (W2) and "there's very little protection there that's cooling" (W3). "The old fashioned bubblers were great", but the new refill stations (designed with the assumption you are carrying a bottle) are "hard to get your head under" (W1). No bubblers and a lack of toilets in public environments mean that people don't drink and therefore get hotter, and again a lack of cool places to rest was a problem. "The post office, MyGov and Centrelink – they feel like they are literally hundreds of miles apart" (W1 and W2).

Bus stops were also an issue for these participants, with many comments made about a lack of amenity to support the comfortable use of public transport. "The bus stops don't protect you from the rain and most certainly won't protect you from the sun." …"You have to go and put your hand out or the bus driver won't stop for you" (W2). "You have to stand in the full west sun to wait for the bus now, you have to line up" (W3).

Tree Stories

There was a general agreement about the need for street trees for shade, cooling, and weather protection, particularly at bus stops. However the group had strong views about the appearance and 'appropriateness' of trees, with quite stringent qualifications as to what constitutes an acceptable, or 'worthy' tree. There was a general dislike and distrust of the eucalypts found in many Penrith parks, as participants had experienced them dropping branches and falling on houses; "I'm very wary of trees"(W4). Eucalypts were perceived as a particular threat when in close proximity to houses (and it should be noted that insurance companies are now quite explicit about framing trees in close proximity to houses as a liability).

Figure 10: 'Inappropriate' tree near house, Belair St, Penrith. Photo: Helen Armstrong 2008

Figure 11: Treeless Ironbark Drive, Penrith. Photo: Helen Armstrong 2008

Figure 12: 'Appropriate' Trees, Images from Tree Sheets. March 2016

'Appropriate', 'sensible' trees suggested in Group 1 were Jacarandas, Tibouchina, Crepe Myrtle, bottle brush for birds, olive trees, deciduous trees (as you only need to rake up the leaves once a year), Magnolia Soulangea, and grape vines.

Figure 13: Shading by grape vines. Images from Tree Sheets. March 2016

Concern was expressed about trees in bushfire zones – the Blue Mountains fires of October 2013 were still fresh in people's minds. Participants also expressed concerns about water scarcity both in relation to the heat and population – "where will the water come from for the new growth in Penrith?" (W4).

Cool Future City

Many of Group 1 participants' ideas for a cool future city were things they had previously seen or experienced. 'Fixing things' seemed to these women as just a matter of common sense and consultation. "We need a cool central park in Penrith with avenues of trees going out lined with shops, lots of green space, green roofs; water fountains and (movable) sails over walkways" (W2). There was discussion about strategies in other places, for example, "in Europe (rather than planting trees) they spray

fine mist into the air – that's better 'cause you are not walking over roots and things" (W1). Another idea was narrower walkways, with vines you could grow "up and over" (like South Bank in Brisbane), and multi-use of spaces such as car parks. One participant noted car parks could be made of 'grasscrete' to reduce heat and glare and could then be used for other activities (a point that ties in well with the objective to increase cool and permeable pavement in Penrith City's Cooling the City Strategy). If we need car parks, then there should be trees every 5 or 6 cars because "it will be over 50 degrees in your car and you could pass out or have a heart attack on the way home"(W1). When not in use as a car park, the space could then be used for other things – "people could sit under trees like they do in Europe and watch kids play" (W1).

Figure 14.'Grasscrete'. Image source: www.grasscrete.com

Group 2: Carers at NADO

> *Whoever controls the traffic lights needs a good swift kick up the backside – especially in the heat. You can sit and sit and sit and sit – sometimes I have sat at the lights for 10 minutes – waiting for them to change in the heat!* (W1, Group 2)

A chief concern for this group of 7 women (including 1 person with a disability + carer) and 3 men from Kingswood and St Marys, all aged 55 plus and all carers of daughters/sons with disabilities aged 21-61 years, was how to achieve a good quality of life with reduced mobility. Coping with the heat was extremely difficult out and about, and so many of the participants in Group 2 spent the vast majority of their time indoors, in their own homes or at the NADO Centre. (Note: In the Out and About study [2008], disability coordinators indicated several barriers to accessing public open spaces in the Penrith LGA. Our pilot found a lack of facilities for the able bodied, let alone specialised facilities for those with disabilities!).

Figure 15. Penrith Carers Group Photo: Helen Armstrong March 2016

Strategies at home

All participants in Group 2 had air conditioning at home. This simple fact meant management of cooling at home was less of a problem than for other groups. Even so, the peak afternoon heat was a problem dealt with by keeping windows, thermal curtains and shutters closed.

Private gardens were important to many carers, with one participant trying to 'save his garden' of lavender and azaleas by putting in three water tanks. W1 complained that while many desirable plants could not withstand the heat, many others 'grow wild' due to the humidity. Remarked one participant "We used to have four seasons, now only two – we go straight from winter to summer!" (M1). While private gardens were a focus for carers, the disabled children in this group were less involved and did not garden. "My 61 year old daughter) likes to look at flowers and that… we try to take her out…sometimes she will" (W2).

Participants generally disliked the new housing developments with their small back yards such as UrbanGrowth's compact development 'Thornton' near Penrith Station, and the treeless housing in Jordan Springs. (W1): "You (city dwellers) get your hot days, but then you get the sea breezes. We have nothing here and if they are going to concrete us in, like they are, it is just going to get hotter, like on that map (referring to Penrith heat map)."

Figure 16: Promotional image of Thorton, Penrith Source: UrbanGrowth 2015

"All this multi-development – high density units – we are all going to be in a hot dome – the heat is just going to sit on top of us!! ...we need housing but they are not thinking about how to do it." (W1)

The Amenity of Public Environments

Moving about the city in hot weather, even in a car, was generally perceived as uncomfortable by the carers in Group 2. There was general agreement about the lack of shade, and for this group there were other frustrations such as pedestrian lights not lasting long enough for them to comfortably get across a road with a wheelchair.

These participants experienced considerable challenges transporting their son or daughter to and from the NADO centre, as the opening quote to this section suggests. A participant commented that it's not too bad in the mornings, but it can be dangerously hot at 3pm when they go to collect their children. When it is very hot in the car, disabled people can have seizures; so on very hot days they may stay home, which obviously has social consequences.

Those who did go out enjoyed Central Gardens in Merrylands, but only in the morning (this could relate to the hot car journey to get there because this is a shady park as the below afternoon pictures show).[4] There was also mention of a local park: "they've done one up in Bass St that's a really nice place to take the grandchildren." (W2).

Figure 17: Mother's Day, Central Gardens, Merrylands May 2015. Photos: Helen Armstrong

[4] Helen Armstong from our research team designed Central Gardens, Merrylands in 1977.

There was a dislike of parks that are 'too open' such as Jamison Park with treeless playing fields. The radiant heat from car parks and roads was seen as a deterrent to visiting this park. "You need to put seating in the shade, not in the sun (like around here)" (W2). Linda Wilson, our contact at NADO had previously mentioned a lack of seating under shade at the off the leash section of Jamison Park, so dog owners who miss out on a spot have to stand in the blazing sun.

Figure 18: Treeless Playing Fields and carparks, Jamieson Park. Photos: Helen Armstrong 2008

Parks must have shelter for the disabled. Parks such as Tench Reserve and the new small local parks near Bass St, Shepherd Road, and Colyton and Lizard Log on Camden Valley Way, were seen as more amenable, though with accessibility issues (see Sofoulis et al 2008). Participants enjoyed Penrith City's 'By the River' series, held in the cool environment of Tench Reserve. As for Group 1, this group saw the mountains as a 'beautiful retreat' in summer, though the bushfires of 2013 were still fresh in people's minds and certainly inflected their perception of trees.

Figure 19: **Picnics in Tench Reserve**. Photos: Helen Armstrong 2008

Tree Stories

A participant in Group 2 described Eucalypts, Planes and deciduous trees as 'dirty'. Eucalypts "explode in the heat!" (W2). A preference was expressed for native trees and there was a concern about natives in the Cumberland Plains being affected by disease and dying. Pines were perceived as having root problems.

Participants in Group 2 described Jacarandas, Crepe Myrtle, Gordonia, and Bottle Brush as "trees that are worthy", "safe for public" and "environmentally friendly" i.e. not big trees. Frangipani, hibiscus, and camellias, although not trees, were considered important for

cooling windows. The aesthetic dissonance produced by pruning to make way for electricity wires disturbed participants in Group 2 – in this case trees were considered unsightly and dangerous. “We want trees but need people to maintain them and still keep them pretty” (M1).

A participant in Group 2 also noted that wheel chairs and walking frames don’t cope with leaf litter or flower/ fruit falls from trees such as Jacaranda or Plane trees.

Cool Future City

Group 2 wanted to see nightly street cleaning so wheel chairs don’t slide on leaf litter. Participants appreciated Tench Reserve and wanted events like the River Festival and ‘By the River’ series sponsored by Penrith City to continue into the future. Participants in this group wanted to see ‘better planning’ and no more cul-de-sacs “like in Glenmore Park” that separate neighbourhoods, inhibit walking, and increase travel times. Participants liked Oran Park with its new back lanes for accessing garages, with trees out the front and no parking in the street.

Group 3: Aboriginal Supported Playgroup

> *How do I cope with the heat in summer? By keeping as still as possible!* (W3, Group 3)

The ten Aboriginal and/or Torres Strait Islander women in this group all had small children less than 5 years of age. In the relatively small room housing the playgroup, there were as many service providers as mothers. The data gathering process was a little more chaotic than it had been for the previous groups, as we needed to fit in with the children’s program, breaking for story and song time. Helen occupied the children with a mapping activity while Abby talked to the mothers, and wrote notes. Our contact Carolyn Gilbert had previously provided us with some insightful anecdotal evidence about how heat stress affects the Aboriginal communities in Cranebrook. She explained that in summer, people need to move downstairs in their homes and that they spend a lot of time in the neighbourhood centre, which is air conditioned. This correlates with findings from the Cooling the City Strategy, which identifies poor housing design as a key issue for these communities.

Strategies at home

In contrast to the previous groups, none of the participants in Group 3 had air conditioning or other forms of artificial cooling in their homes. One Cranebrook mother described how unbearable it was being pregnant without air conditioning or fans. Another participant from this community said it’s very cold in winter and in summer “you don’t know what hot is”(W2). Typically the community lives in rented housing that is poorly designed and in dire need of maintenance. An example was Beacroft Pl, Cranebrook – a typical 1970s cul-de-sac of Housing Commission townhouses that lack insulation. Carolyn explained this community was isolated and experienced a number of social problems that were exacerbated by the nature of the built environment. The Koolyangarra Aboriginal Child and Family Centre runs a pop-up park in a nearby open space area and welcomed our future involvement in this activity.

Figure 20. Beacroft Pl. Cranebrook.
Photos: Helen Armstrong April 2016

Group 3 expressed less capacity than the previous groups to modify their environments to maximise cooling. As already indicated, a coping strategy in Group 3 was to remain as still as possible - one participant said she lies on the bathroom floor. Two of the participants in Group 3 remarked they had sore knees and backs, and "couldn't be bothered" to walk in the heat. It is important to note that the social pull of the playgroup was enough for people to overcome their inertia, supported by the air conditioned bus from the Centre that transports parents, carers, and children.

The Amenity of Public Environments

Mothers in Group 3 had memories of riding their bikes and scooters around the streets but said their kids don't ride as it is too hot. Two said their kids didn't go and play after school, but usually came home "to just chill" (W1). The streets are too hot for parents to push prams or walk – this point was supported by several of the mothers interviewed in Group 3. A member of the Support Staff in Group 3 revealed that children in the Mountains' Childcare Centres she visits can play outside all day whereas in Penrith and Blacktown children can only be outside until 9 to 10am – the remainder of the day, they have to play inside. The Childcare Centre in St Marys allowed children outside in the mornings, but with the recent removal of the plane trees in Queen St, the heat load generated by the surrounding car-parks and streets mean that children now have to stay inside all day.

This support worker also indicated that there are no parks shady enough in the area for the council sponsored mobile play van to visit. While participants across all groups were very aware of new Penrith developments and had criticisms of them, none of the Cranebrook participants we spoke to knew of the mobile playvan service, although it visits nearby Jordan Springs. Those with cars take the children to shopping malls (like Southlands in Penrith) or to McDonalds Playland. Older children go to the indoor pool or Blacktown outdoor pool. W1 mentioned that her kids enjoy Nurragingy Reserve Water Park at Doonside, but said that it is difficult to get to as she didn't have a car. Penrith outdoor pool was also mentioned, with one mother (W3) saying she used to "live at the pool" but that she found it too hot for the kids now; the equipment gets too hot to play on and there is a lack of shade cloth.

Tree Stories

The same distaste for large eucalypts was prevalent, with Tibouchina pointed out as a preferred tree. One participant described how she appreciated the cooling breeze through her tree and mentioned it had a beehive in it. However the dropped flowers are slippery and "stick to the grass and

shoes.” The tree sheets were helpful in facilitating discussion but the topic of trees seemed a long way from the key concerns of this group, and the relation between their wellbeing and trees was not clearly perceived.

Cool Future City

Ideas for a future cool city in this group were focused on the health and wellbeing of the children, and there was a strong relation between water and play. The need for kids to safely socialise was important, with a desire for “little lakes, little water parks” (W1) and places they could ride bikes. While lack of accessibility was a problem, the need for a more walkable city did not naturally arise out of the earlier discussion about lack of shade and pram-friendly paths.

Observations: Strategies at Community Centres

During our site visits we witnessed interesting cooling strategies and signs of heat stress related to the accessibility of water. Water was fundamental to play for the teenagers of Cranebrook and the 'fun cooling' witnessed at Koala Childcare Centre, St Marys where childcare workers sprayed fully clothed children with a hose.

Figure 21: **'Fun cooling', Koala Childcare Centre, St Marys**. Photo Helen Armstrong December 2015

Water scarcity challenges the capacity to create a cool environment through planting. An example is the edible garden at Tamara Children's Centre, Cranebrook, which was allowed to dry out while the captured water was reserved to keep the more visible areas of the childcare centre looking lush. A well-irrigated environment was understood in this context as a caring and cared for environment, a point that we feel has broader implications.

Figure 22. Tanks and dried out edible gardens Tamara Children's Centre, Cranebrook. Photo: Helen Armstrong December 2015

6. Reflections on What We Found

Types of Cool Commoning

For the purposes of this report we define 'cool commons' as spaces and places that offer cooler temperatures than surrounding areas and that are used by, and are accessible to, a community of commoners who, to some degree, care for, take responsibility for, and benefit from this coolness. Shopping malls, community centres, rivers, public pools and shaded walks (such as at Tench Reserve) are all cool commons identified in our study and yet the dimension of 'caring for', and 'taking responsibility for' these commons was largely absent. While participants in Group 1 were actively adapting their homes to make them cooler and participants in Group 2 were keen gardeners, there were few examples in this pilot overall of **active** community commoning, such as caring use of public amenities such as swimming pools and parks, or bush care in patches of urban forest. The activation of community commoning remains an aspiration of this research; to facilitate community involvement in cooling the city in ways the community can appreciate and take ownership of. *This is something we would like to address in further research.*

In our hotspot locations the 'cool commons' could be categorised in three ways:

- As **residual** commons, a legacy of past actions of, for example, tree planting or restrictions on river shore occupation or of past skills and practices that may or may not have been maintained (as identified in Group 1);
- As commons produced by **transgressive** acts that are illegal or not condoned, such as occupying 'private' air conditioned spaces for extended periods of time (such as shopping centres, MacDonalds or community centres) or use of water features for play; or
- As **aspirational commons**, that is, what people would like to see as constituting a cool commons in their environments. In our data, aspirational commons were linked to the provision of basic cooling amenities (shade, shelter, water) coupled with the provision of paths and walkways. They were also linked to improved access to water play, parks, and pools.

People said they would like to see an increase in events held in cool commons (such as concerts at Tench reserve) and the multiuse of existing purpose-built environments at alternative times of the day (such as car parks). Evenings and night were identified as more comfortable times to inhabit cool commons. Aspirational commons could include the reactivation or rekindling of common knowledges in decline or the sharing of knowledge that people exercise in their private homes (for example cooling home modifications, repair, gardening or practices such as bike riding for example). We see in these aspirations potential to develop interventions to engage the community in cooling the commons.

Issues Undermining the Capacity for Active Commoning

The compromised liveability in our hotspots can be linked to a few key structural issues that leave environments vulnerable to heat stress and undermine community capacity for commoning. These give us some clear directions for further research. These are:

- Lack of amenity (shade, seating, water fountains, and toilets) to facilitate moving around in public spaces.

- Lack of cooling shade for areas of waiting (such as bus-stops, traffic lights, sports fields), playing (shade cloth for play equipment in parks), and walking. This issue was consistently commented on across all the groups. Places to rest in shade, get a drink and go to the toilet are important, regardless of whether these are 'public' or 'private' environments.

- Lack of trees. Participants remarked that street trees were needed, particularly around bus stops; however, there was a perception that the opposite is happening and street trees are being removed. We found that not all trees are seen as equal, with some deemed 'more appropriate' than others. Large Eucalypts in parks or near homes were considered particularly threatening, and there was a relation between the pruned, maintained tree and the acceptability of the tree species. Recent events such as storms and the 2013 bushfires have negatively impacted on the perception of trees across all groups. *It is clear more work needs to be done to facilitate a change in attitude toward trees.*

- Lack of access to free, clean public water for drinking and for play was a keenly felt problem across the groups. Participants also expressed concerns about water scarcity both in relation to the heat and growing population – "where will the water come from for the new growth in Penrith?" (Participant Group 1).

- Dislike of new housing developments and a sense these are not designed to facilitate cooling. Groups did not see these developments as part of the existing community. *It was clear even with this small sample that more work needs to be done to connect new and existing communities.*

- There was a feeling (particularly in Group 1) of not being listened to by decision-makers in relation to the design of the city. Participants felt they had creative ideas they could contribute. *More work needs to be done to elicit the creativity of community members in the design of a cooler city rather than recruiting people into a pre-determined vision or plan of a cool city.*

It is clear that these issues are related and mutually reinforcing. For example the lack of amenity in public environments has contributed to a decline in physical activities such as walking and bike riding. Yet these relationships are not necessarily perceived by communities.

7. RECOMMENDATIONS FOR FURTHER RESEARCH

Cool commons are a social and cultural concern that requires the knowledge, interest, and action of people. It is clear even from this small sample that cool commons are an aspiration for the future rather than in any way a reality experienced by people living in the three hotspots we researched. Our findings show that shade, shelter, and water commons are required for a cool future city. However, it is not a case of 'build it and they will come' or 'regulate and they will behave'. Normative social practices that have grown up around current conditions, such as children playing indoors for large parts of the day, will be difficult to change, and require action in relation to both the built and social environment on an ongoing basis. The listlessness of participants in Group 3 for example, is not a matter of choice; it is a result of a range of social and material conditions constraining the ability of people to move about their environment comfortably. As people grow more sedentary, they also grow less fit and able to cope with physical activity. This is equally the case for social practices that seem to be in decline in the groups we researched, such as walking or bike riding. Social adaptations that have occurred in response to the heat nonetheless demonstrate the 'improvisory potential' of people (Pink & Leder-Mackley 2015) and it may be that adaptive strategies will eventually need to be quite dramatic – such as adopting the European siesta and carrying the active part of the day later into the evening or early morning.

Much of what we found in this pilot reinforces what we already know about the impact of urban heat on liveability. However, our focus has been on understanding the social dimensions of this impact and looking for opportunities to support active commoning. Our recommendations for further research therefore step into the space of interventions to support change.

A Co-design Approach

The research we reviewed indicates the importance of (built and social) interventions in encouraging usage of urban green space and activating commoning. It is critical for the communities directly affected to be involved in the design of such interventions. We found participants were particularly interested in volunteering ideas for a future cool city and in sharing their knowledge. There is potential to expand this in a meaningful way by taking a co-design approach to further research. Co-design, a standard of practice in design-led community consultation, would help us to determine what sorts of commoning practices people are interested in investing their time and energy in and what they need in order to pursue this. Co-design as a mode of research gathers social data through workshops that elicit the creativity of participants in ideation processes, developing prototypes for physical infrastructures and amenities or for new social enterprises. This can involve 'fun exercises' like creative mapping that allow for emotional layering on geographical places – how they are lived and experienced now, and how they might be lived and experienced in the future. This pilot has helped us to discern several points of focus for further research along these lines that could involve a range of people from the local community including service providers such as our contacts for this study, as well as local businesses and government actors.

A Co-design approach will help us to further explore the important issue of accessibility as well as how trees that are deemed 'appropriate' both environmentally and socially, might be better incorporated into how people imagine a cool city. It will also help us to explore how existing and new communities in Western Sydney might be better connected to the place in which they live and to each other.

Access to cool commons

A review of international initiatives and approaches reveals many possibilities that we could try here, including a service approach to the built environment. For example in Pittsburgh in the US, when 'real feel' temperatures reach (equivalent) 32 degrees (real feel temperature measures a combination of temperature and humidity) 'cooling retreats' are opened across the city for residents aged 60 years or older, with refreshments served. This example of shelter commons responds to a social action indicated in Penrith City's Cooling the City Strategy to "investigate the location of potential heat refuges across the City and their proximity and availability to vulnerable populations" (2015 S3, p.27). As we discovered in this pilot, environments like community centres and shopping centres are already operating as cooling refuges, and the idea of multi-use spaces was an aspiration for participants. More research is needed to explore the potential for cooling refuges and how the community could access these for example by way of a dedicated bus service, perhaps sponsored by local businesses. We might draw here on already established mobile strategies such as the council-sponsored play van or community shuttle buses.

Water commons

Water has a material, social and symbolic value in the creation of cool commons. In this pilot well-irrigated areas or those in close proximity to water were perceived amenable and desirable (both 'caring' and 'cared for'). The relation between water and cool commons may seem obvious, but it is connected to myriad activities where water is both directly and indirectly implicated. More public access to water in parks and other public environments is required but in a way that demonstrates sensitivity to issues of water scarcity. As discussed in the Cooling the City Strategy, irrigated urban and riverside environments such as Tench Reserve are cooler, and have a range of environmental, social and psychological benefits (see also Fam et al 2008). Another recommendation of this research is therefore to explore opportunities for greater access to public water; to expand the possibilities for events located in riverside locations and to improve access to those events.

Understanding trees

It was clear that more work needs to be done to facilitate a change in attitude toward trees. We found that while the people we spoke to recognised the value of trees for cooling, there was a distrust of large trees and a desire to see trees being managed and maintained. Furthermore, the cooling role of trees was underappreciated. The Tree Sheets we trialed in this pilot helped to facilitate discussion as people could identify the trees and point to the ones they liked or disliked. These could be further developed to facilitate community education and engagement around

trees,[5] a key objective of the Penrith Cooling the City Strategy (2015 E1 p.24), and inspire the inclusion of trees in how people imagine a future cool city. Some members of the community have knowledge and knowhow about trees that could be shared with others. We would also see our role as facilitating the sharing of that knowledge.

Cooling practices

While one-on-one home interviews were not conducted as part of the pilot, we still feel this is worth exploring in further research into everyday cooling, as it would add an important material and practical dimension to what people say they do. The Penrith Cooling the City Strategy stresses the importance of encouraging cooling on private property, as it covers so much land (2015, p.17). This method of research could facilitate the sharing of personal cooling strategies and in contrast to the focus on private property, how they might translate into forms of commoning beyond the individual home; for example, in relation to public amenities that have further commoning potential such as local pocket parks and drainage reserves.

We would also like to invite a community-based research approach by inviting people to photograph and take the temperature of their home environments and record these in a diary form or enter their data directly into a visual mapping tool such as the Commons Sensor (http://commons-sensor.openlocal.org.au). This would build both participants' environmental awareness and a more fine grain record of heat experiences in built and social environments. 'Citizen science' could be an important facilitator of social learning.

[5] We envisage the Tree Sheets would involve a comprehensive index of local and native trees in various states of maintenance, drawing proactively on research being done by the Hawkesbury Institute for the Environment (HIE) at Western Sydney University, to determine the most appropriate plants for cooling the city.

8. Conclusion

Cooling the Commons builds on the spectrum of recent quantitative research to contribute a unique and important qualitative dimension to understanding how people living in local government areas with low tree canopy rates experience summer heat and manage their thermal comfort and sun protection at home and out and about. We argue that qualitative research responding to the sociocultural and biophysical challenges of 'cooling', is missing from the research picture currently being assembled and will get us further toward understanding the question of how to 'catalyse social change'.

We draw on important work in the fields of community economies, design and science and technology studies, which help us to understand better the link between built and social environments identified as critically important in the literature we have reviewed. We argue that social change depends on participation and engagement, but it also requires attending to the designed infrastructures of everyday life that can inhibit or support this participation and engagement.

The preliminary findings of the pilot study support many of our hunches about the dynamics of change impacting on liveable, cool commons in Western Sydney. We identify opportunities for further engaged research with communities, local government, and businesses, to support the implementation of cooling strategies in designated areas of vulnerability in Western Sydney, where urban heat and socio-economic disadvantage appear to converge (Penrith City Council 2015; Jacobs nd; SEIFA 2011).

Figure 23. Photo: Helen Armstrong March 2016

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10. APPENDICES

(i) Recruitment materials: Poster

Phew! It's going to be a hot one!

How do you find the summer heat?
Do you find it easy to keep your cool, or do you wind up hot under the collar?

We are a group of Western Sydney University researchers and we want to hear from you about how you cope (or don't) in the summer heat. We're interested in finding out how you already stay cool (or don't) so that we understand more about dealing with heat. That way, we can talk to planners and policymakers about what they can do to help cool our cities. While there's a lot you can do to stay cool, there's also lots that can be done to help keep our cities cool.

If you want to take part, one or two of us would interview you for about an hour and ask you about your experience of summer heat and how you try to stay cool both at home and outside of home. If you approve, we'd also like to take some photos to illustrate the things you talk about. If you do take part, you can stop participating at any point without any problems.

You can also provide feedback on the project, and register with us to keep informed about the project and its findings. We will give you a $30 voucher at the end of the interview to thank you for your time and knowledge.

To find out more, or to make a time to have an interview, please contact us. We look forward to hearing from you.

Contact:

Dr Louise Crabtree
Institute for Culture and Society
Western Sydney University

Phone: 02 9685 9646 or 0420 946 186
Email: l.crabtree@westernsydney.edu.au

(ii) Schedule of interview questions

COOLING THE COMMONS

Semi-structured interview questions

- How do you feel about summer in your city?
- How do you tell how hot it is during summer?
- Do you make any changes around the house and garden to prepare for summer?
    - Can you describe to us/ show us how this works?
- What changes do you make around the house and garden to keep cool during summer? For example, what do you do on a hot night?
    - Can you describe to us/ show us how this works?
- What do you typically wear to work/ around the house/ to go out during summer?
- Do you find the heat changes what / when /where you and your family eat?
- What sorts of activities do you/your family engage in during summer?
    - If you go out, where do you go? How do you get there? What do you take?
    - What do you like/dislike about these activities?
- Where and when did you develop/learn these cooling practices?
- What changes if any would you like to make to your home and garden to keep them cooler during summer?
- What changes if any would you like to make to your city to keep it cooler during summer?
- Do you have any concerns about the effects of heat now or in the future that we haven't yet talked about?
- Would you like to be kept in touch with the progress and outcomes of this research?

(iii) Tree Sheets (sample)

COOLING THE COMMONS: EUCALYPTS – SPOTTED GUMS

Tree	Comments
	

COOLING THE COMMONS: IRON-BARKS

Tree	Comments
	

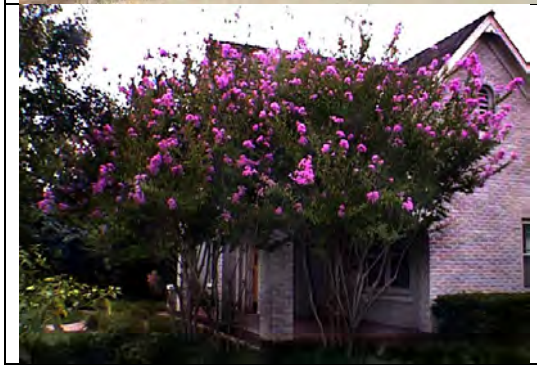
COOLING THE COMMONS: SHE-OAKS

Tree	Comments
	

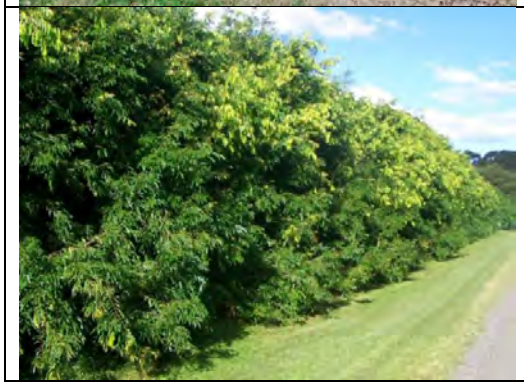
COOLING THE COMMONS: CREPE MYRTLE

Tree	Comments
	

COOLING THE COMMONS: LILLY PILLY- SYZYGIUM

Tree	Comment
	
	

COOLING THE COMMONS: CUPANIOPSIS

Tree	Comment
	
	
	

COOLING THE COMMONS: GRAPE VINES

Vines	Comments
	
	
	
	

COOLING THE COMMONS: JACARANDA

Tree	Comment
	

COOLING THE COMMONS: MAGNOLIA SOULANGEA

Tree	Comment
	

COOLING THE COMMONS: TIBOUCHINA

Tree	Comment