

Climate change in Western Australia

University of Western Australia response

Introduction

The University of Western Australia is pleased to see our Western Australian Government taking a coordinated and long term approach to the challenges of climate change. This Issues Paper is an excellent start to what will be a long and difficult, albeit exceedingly important, process for our State, the country, and the world. UWA looks forward to collaborating with the Western Australian Government and with other public and private organisations to provide a compelling evidence base, offer insights into overlooked yet critical aspects, and propose recommendations to inform policy debates and decisions.

We appreciate the notion of a roadmap for transitioning to a resilient, low-carbon economy and future for the State in which prosperity is shared, and equity and well-being for all put front and centre. This entails the need to protect the most vulnerable members of society and reduce their multidimensional vulnerabilities, enhance adaptive capacities and resilience across demographics and sectors, and understand difficult trade-offs and unavoidable losses, all in alignment with the Paris Agreement. Our input to the Issues Paper is also in alignment with the Australian National Outlook 2019¹ and the five key shifts identified for the country (Figure 1).



Figure 1: Five key shifts¹

¹ <https://www.csiro.au/en/Showcase/ANO>

The same Outlook lays out the possibilities for Australia to achieve the ambitious Paris goal of 1.5°C global warming above pre-industrial levels as the absolute best-case scenario (equivalent to the IPCC RCP 2.6) while also showing a worst-case scenario of up to 6°C warming (equivalent to the RCP8.5) by the end of the century) (Figure 2). It is within this context that the UWA submission to the Issues paper is situated.

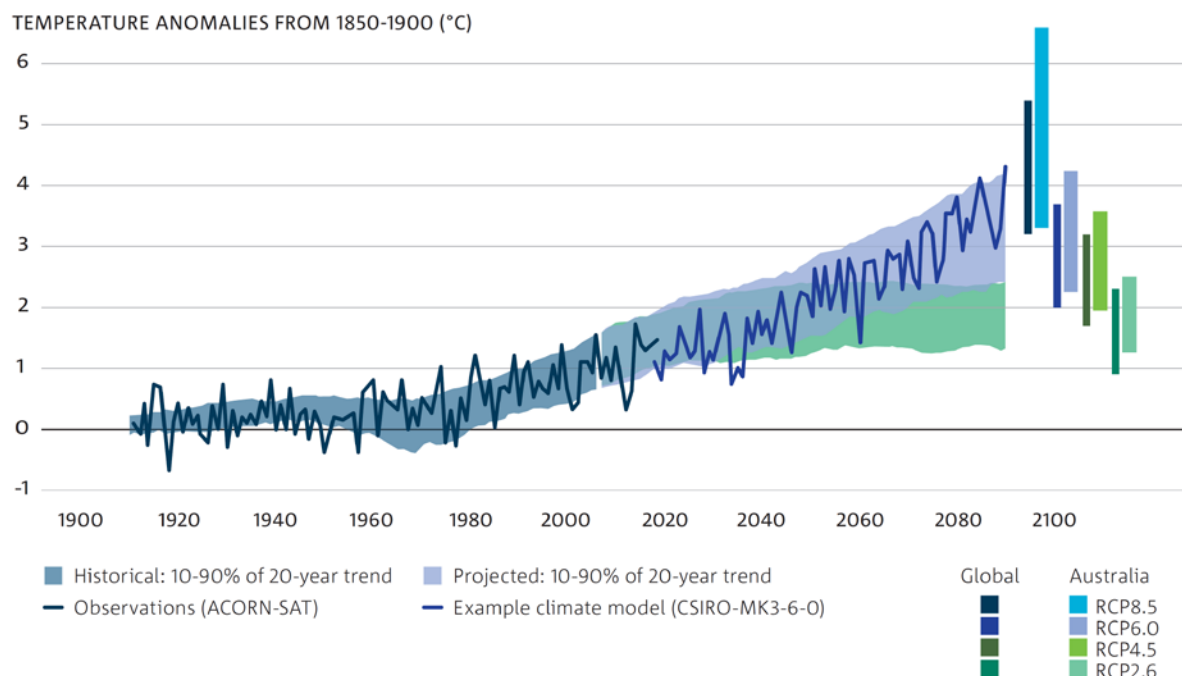


Figure 2: Australian temperature record and projections²

This figure shows a time series of Australian average annual temperature anomalies from 1910 to 2100 relative to a baseline approximating pre-Industrial conditions (the 1850–1900 average). It includes observations, the range from the Coupled Model Inter-comparison Project phase 5 (CMIP5) set of global climate models and an example model. Future projections use the Intergovernmental Panel on Climate Change's (IPCC) emissions scenarios, termed Representative Concentration Pathways (RCPs). The bars on the right-hand side show the average for each RCP in 2080–99 globally (thin bars) and in Australia (thick bars). For more details on data sources and methods, visit www.climatechangeinaustralia.gov.au

Before addressing the issues paper, we believe it is important to briefly consider four related meta-issues which sit above and between these issues.

Firstly, while climate change is not the only major environmental challenge our society currently faces, it is a key multi-sectoral issue that will require sustained community support and understanding, as well as functional community-state relationships, to develop and maintain effective mitigation and adaptation strategies. The move to a resilient low-carbon society entails a shift in values that will entail cultural work not adequately captured under the functionally-oriented headings around which this report is (otherwise usefully) structured. The way the Issues Paper is written suggests that citizens are passive receivers of climate solutions rather than creative change agents who can and should contribute to safe and healthy communities and liveable towns and cities. The policy should therefore consider the role of the WA Government in building community support, fostering participation and awareness for adaptation and mitigation, and encouraging the co-design of locally and regionally meaningful and equitable pathways toward a resilient low-carbon future, for example through communication tailored to specific constituencies, creative and

²<https://www.csiro.au/en/Showcase/ANO>

experimental co-learning, school-based educational programs, and the arts. An inclusive and resilient culture will require “inclusive civil and political institutions that foster greater engagement, curiosity, collaboration and solutions”³.

Secondly, the role the WA Government plays in affecting and implementing the various actions to be taken, across different spatial and temporal scales, requires more scrutiny. Clearly, there are certain aspects the WA Government can control directly while other aspects are better managed through partnerships with different WA communities and constituencies. Finally, particular aspects are likely beyond its control as they concern federal policy guidance, yet the WA Government may exert certain influence at higher political levels. Hence, understanding where, how, and with whom particular adaptation and mitigation strategies and pathways are best deliberated, tested, implemented, and possibly scaled up requires a conscious commitment to collaboration. Such collaboration will make it easier and more transparent to debate possible choices and likely trade-offs, to identify limits to adaptation, and to negotiate what climate resilience may mean in different contexts. Through joint ownership over climate solutions, the various constituencies (other than the WA Government itself) are more likely to pursue and defend these solutions, in both the short- and the long-term.

Thirdly, we need to think about the mechanism of social and economic change for climate adaptation and mitigation, and the framework of accountability, including how Western Australian local, regional and state decisions and actions mesh with federal and international initiatives and commitments. Does our State need a climate action peak body with a coordinating function? An integrated government-community organisation? How can we ensure that this has longevity beyond the political cycle?

Fourthly, responding to climate change involves a range of psychological issues, including (1) the resistance that climate action will face from some individuals/industries and how to deal with misinformation in this space; and the questions of (2) how to communicate evidence and promote action; and (3) how to induce behaviour change in an ethical yet effective manner. These issues will be discussed in more detail in the final section of this submission.

Climate change and its numerous and unequivocal impacts remain a politically divisive issue. Nevertheless, or perhaps because of this, we must recognise the importance of evidence and rigorous analysis in making sensible and effective policy decisions. In doing so we note that for some aspects of climate change there is significant Western Australia-specific data available, while for other aspects the data is more limited. In the following sections, we identify, for areas where UWA has academic expertise, existing data, insights and recommendations as well as data gaps on the path toward a progressive climate policy in Western Australia.

³ <https://www.csiro.au/en/Showcase/ANO>, p70.

Issue 4: Regional prosperity

The size of our state and the dispersed regional population present significant research and service challenges.

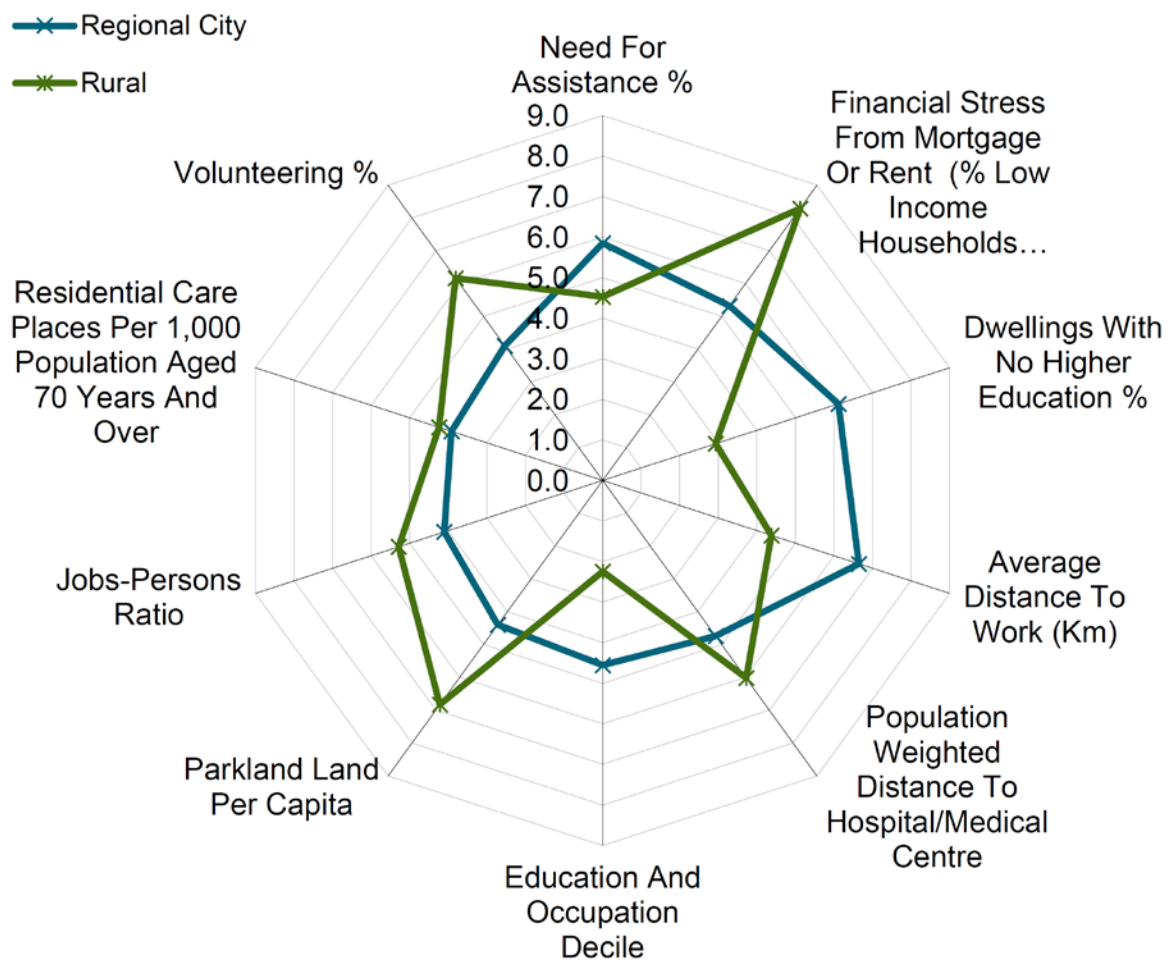


Figure 3: Ten metrics of liveability for rural and regional city zones. Higher rankings indicate higher social outcomes.⁴

⁴ Australian National Outlook 2019 Technical Report, <https://www.csiro.au/en/Showcase/ANO>

The Australian National Outlook 2019 (Figure 4) has explored how Australia can reach various mitigation targets by mid-century. This includes a lot of tree planting and carbon farming sequestering (offsetting) 260-700 MtCO₂e by 2050-2060, through compelling carbon pricing, reaching net zero emissions by 2050.

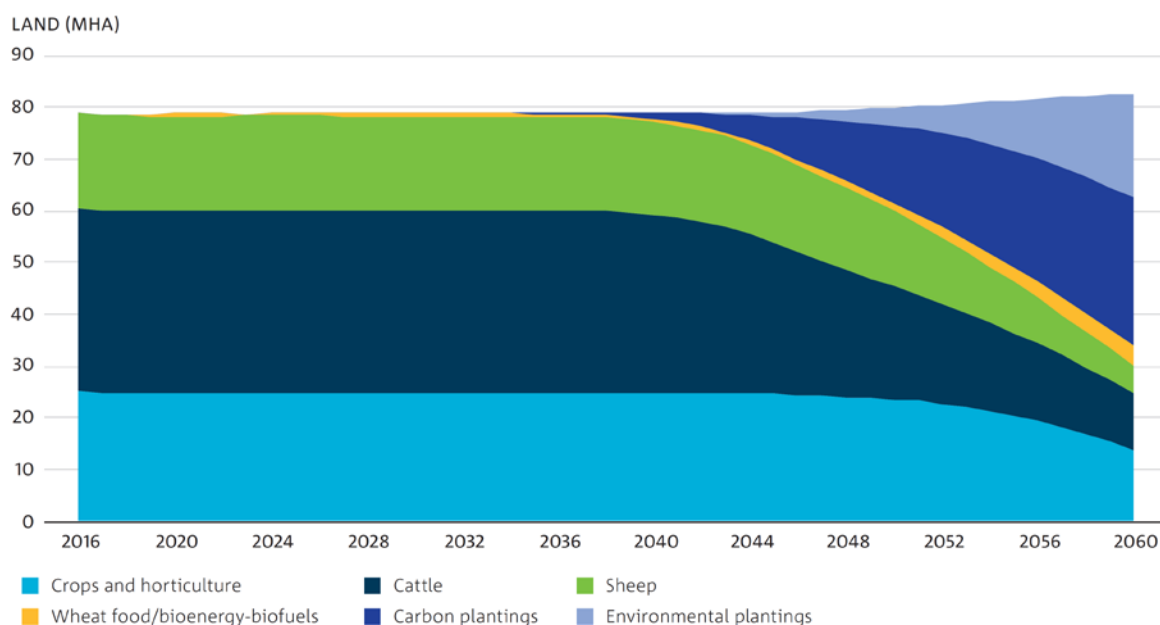


Figure 4: Land use (2015-2060), best-case scenario for Australia⁵

This figure shows the shift in land use modelled over the *Outlook Vision*. In a cooperative global context, there is a wider range of profitable land uses, such as biofuel production and carbon sequestration in monoculture or mixed-species plantings. There is significant emissions abatement potential associated with the level of land use change in this context, including emissions avoided in agriculture and through some displacement of fossil fuels by bioenergy.

In Western Australia we are lacking a current baseline for soil and biomass carbon storage (a complete carbon budget) and overarching strategies to enhance the carbon budget through agriculture, forestry and other land management options, with decadal timeframes, associated with specific and available parts of land throughout WA.

Issue 6: Safe and healthy communities

Understanding climate-related risks and strategies to ensure safe and healthy communities requires an understanding of the timescale and magnitude of the expected adverse effects of climate change on the future health and well-being of Western Australians. To ensure that these effects are mitigated, accurate predictions are needed of the expected effects of climate change on health in WA. To provide these predictions requires modelling of spatial data on the scale of climate change in each region of the state, the population shifts expected in each of these regions, as well as the breakdown of the vulnerable populations⁶ within each region. These predictions are essential for appropriate planning and implementation of health services and facilities in this state.

⁵ <https://www.csiro.au/en/Showcase/ANO>

⁶ <https://www.aidr.org.au/media/6682/national-resilience-taskforce-profiling-australias-vulnerability.pdf>

Vulnerable populations include children, the elderly, pregnant women and the socio-economically disadvantaged. Children are by far the largest vulnerable group and bear the major burden of climate change with 88% of the total health effects⁷. Vulnerability is also high among people and sectors that have been systematically disadvantaged (e.g. overlooked in state-level policy making, in health, education, housing, employment and other areas)¹. Such structural disadvantage aligns with axes of inequality around age, gender, socio-economic status, remoteness, and geographical location. To reduce harmful effects, more detailed knowledge than currently available is needed regarding the drivers of uneven vulnerability and the factors that keep many people entrapped in vulnerable situations. The latter include, for instance, not knowing what to do before and during an extreme event such as a heat wave, not being able to use everyday forms of communication, not being able to make sense of conflicting or complex information, and lack of trust to decision makers such as emergency managers.

An important and often used approach for dealing with climatic hazards and extreme events is through hazard probabilities. However, limiting our understanding of risk to such probabilities without considering uneven vulnerability and the seemingly non-rational trade-offs people make in high-risk situations unnecessarily increases the risk of those most vulnerable. Only one study exists to date that examines uneven vulnerability to heat stress in WA⁸ with another two comparing Perth with Melbourne and Brisbane^{9,10} with respect to heat wave related injuries and illnesses. A nuanced profile of uneven vulnerabilities and people's preferences and constraints in decision making when faced with a climate-health crisis is long overdue for WA. This extends to health protection in occupational settings, particularly outdoor workers and workers in non-cooled environments. With the projected increase in unsafe working days due to heat exposure in Perth¹¹ we need a better understanding of how to acclimatise and protect these workers.

Moreover, risks to safe and healthy communities should be examined through best-, middle-of-the-road-, and worst-case scenarios, across various spatial levels and for differentially vulnerably populations and sectors – the State Risk project run since 2013 (mentioned on p17 of the Issues Paper) is not sufficient. However, existing strategic guidance should be applied to anticipate and prepare for the worst, despite uncertainties, through such scenarios¹². Scenarios of particular relevance for WA, each overlaid with trajectories for societal vulnerability and future exposure, may include: seasonal events such as wild fires gradually

⁷ Zhang Y, Bi P, Hiller JE. Climate change and disability-adjusted life years. *Journal of environmental health*. 2007;70(3):32-6.

⁸ Xiao, Jianguo, Tony Spicer, Le Jian, Grace Yajuan Yun, Changying Shao, John Nairn, Robert JB Fawcett, Andrew Robertson, and Tarun Stephen Weeramanthri. "Variation in population vulnerability to heat wave in Western Australia." *Frontiers in public health* 5 (2017): 64

⁹ Varghese, Blessom M., Adrian G. Barnett, Alana L. Hansen, Peng Bi, John Nairn, Shelley Rowett, Monika Nitschke et al. "Characterising the impact of heatwaves on work-related injuries and illnesses in three Australian cities using a standard heatwave definition-Excess Heat Factor (EHF)." *Journal of exposure science & environmental epidemiology* (2019): 1.

¹⁰ Varghese BM, Barnett AG, Hansen AL, Bi P, Heyworth JS, Sim MR, Hanson-Easey S, Nitschke M, Rowett S, Pisaniello DL. 2019 Geographical variation in risk of work-related injuries and illnesses associated with ambient temperatures: A multi-city case-crossover study in Australia, 2005-2016. *Science of the Total Environment*; accepted June 6 2019.

¹¹ <https://doi.org/10.1007/s00484-010-0320-6>

¹² <https://www.aidr.org.au/media/6932/04-scenarios.pdf>

becoming more frequent, widespread, longer-lasting or intense ('death by a thousand cuts'); multiple high-consequence events converging such as a series of extreme urban heat waves coupled with extreme fires in the Perth Hills, doubling historic records ('catastrophic events'); or extending chronic stress such as droughts among WA's farming communities and crossing dangerous health thresholds, including farmers suicide and animal deaths ('chronic stress leading to future stress'). While a variety of models and guiding approaches exist¹³, WA has not produced a far-reaching scenarios analysis for the state, its various sectors and for its differentially vulnerable populations. This is a dangerous oversight, possibly even negligence.

Finally, a WA Climate Policy would benefit from following the AIDR's 2019 Guidelines on Prioritisation for Climate and Disaster Risks¹⁴. This entails being explicit about how, where, when and with whom actions can reduce loss and harm while enhancing trust, responsibility, and resilience through improved health and well-being. Resilience is poorly defined in the Issues Paper. As emphasised by the 2018-19 National Resilience Taskforce, resilience is not a given. It needs to be carefully identified and nurtured rather than expected from every citizen, independent of their vulnerability status. Resilience building in WA means enhancing adaptive capacities amongst the most vulnerable populations and broadening their portfolio of future response options. Western Australia currently lacks both a detailed vulnerability profile and tailored resilience-building strategies for its diverse and growing populations, including Aboriginal communities, low-income families, its aging demographic, and migrants and refugees. Health is one of several crucial determinants of both vulnerability and resilience¹⁵, but its contributions to better preparedness and resilience in WA remains poorly understood.

Both community-level resilience strategies and worst scenarios to anticipate disaster risk are needed to deliberate what safe and healthy communities should look like and how to prevent outcomes that further harm already vulnerable and disadvantaged populations in WA, in both urban and rural areas.

Despite a widespread understanding that climate change will have major effects on future health in a region like WA with its fragile ecology and generally harsh environment, at present, no analyses have been undertaken to determine how quickly or seriously climate change will affect health and well-being in this state. Given WA's unique land area, ecology, and climate, as well as its population demography, distribution and makeup, studies of the future effects of climate change on health done elsewhere are unlikely to inform of the situation here sufficiently to help in planning health services to reduce the impact of climate change on health.

Since it is now beyond question that climate change will have serious adverse consequences on health, such research is clearly urgently needed. One might argue that we could learn from research done elsewhere, but, surprisingly, there are few if any studies in other regions or countries that have made such projections. Even if there were, given Western Australia's unique situation, modelling studies done elsewhere are unlikely to inform of the situation here or be reliable in helping plan health services to limit or negate the effects of climate change on health.

¹³ <https://www.aidr.org.au/media/6932/04-scenarios.pdf>

¹⁴ <https://www.aidr.org.au/media/6933/05-prioritisation.pdf>

¹⁵ <https://knowledge.aidr.org.au/resources/profiling-australias-vulnerability/>

There has been only one paper published on the demand for emergency medical treatment with weather in Western Australia¹⁶, and that study used the dry-bulb-temperature as the index for heat stress. It is well known that heat stress in humans depends on other aspects of the environment, including wind speed, solar radiation, and humidity, and that the dry-bulb-temperature is a poor index of human heat stress. Using a rational model of human heat balance that incorporates all of the variables that impact on heat balance will improve the predictive power of models for the impact on economic and leisure activity, as well as hospitalisations and health outcomes of vulnerable populations.

UWA has the expertise required to undertake spatial modelling of the timescale and magnitude of the effects of climate change on future health across the state using existing data on regional changes in climate, and anticipated shifts in population distribution and population vulnerability profiles. This information would allow optimal and cost-effective planning and implementation of health services and facilities in this state to produce the best health outcomes in the future.

UWA also has expertise in thermoregulation and especially in human heat balance modelling. One of the first studies that was published on the impacts of climate change on human activity was published by researchers at UWA. We will begin by using established collaborators, with access to historical data on hospitalisation rates, to model the impact of human heat stress on the demand for emergency services as well as the health implications for pregnant women.

Issue 8: Liveable towns and cities

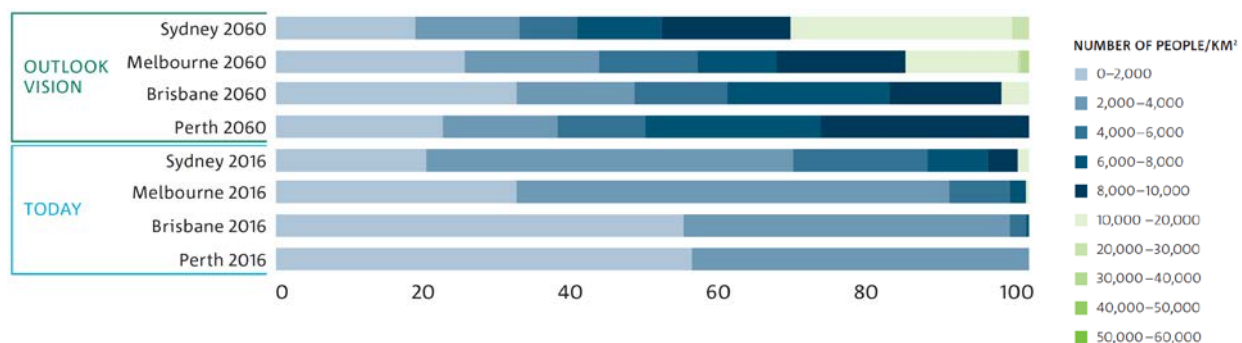


Figure 5: Proportion of population living at various urban densities by 2060¹⁷.

Both population and population density¹⁸ in Perth is predicted to increase over the next 40-50 years. Perhaps the most significant challenge related to climate change with regard to the liveability of our towns and cities, particularly for urban regions such as Perth which have developed in a low-density sprawling fashion, is to accommodate the projected population increases in more compact and connected urban forms. This means increasing the concentrations of activity and dwelling within the existing urban footprint – what is generally termed urban infill, urban intensification or increased density. Whilst in principle this makes

¹⁶ <https://www.sciencedirect.com/science/article/pii/S0160412011002686>

¹⁷ <https://www.csiro.au/en/Showcase/ANO>

¹⁸ Outlook 2019, pp44-45.

sense it needs to be achieved in a manner which ensures less reliance on private motor vehicle use and provides resilience in terms of adapting to urban heat island effects, water scarcity and building and household energy use.

The key strategies are:

- Colocation of urban density with high frequency and well-connected public transport
- Higher density urban forms which preserve and/or promote tree canopy
- Passive environmental design of buildings
- Design of walkable environments

Examples for two significant urban areas in WA that are expected to grow substantially are shown in Table 1.

Table 1: Current and assumed future population for two significant urban areas (SUAs) in rural WA under a scenario of stronger regions and associated population change¹⁹.

SIGNIFICANT URBAN AREA	2016	2060	ANNUAL GROWTH RATE	NOTES
Bunbury (WA)	74,113	738,056	5.2%	recent rapid growth, economic diversification; known to be a planned growth area or; connected to planned national connectivity infrastructure
Busselton (WA)	37,596	348,819	5.1%	Recent rapid growth, economic diversification; known to be a planned growth area; connected to planned national connectivity infrastructure

These SUAs were selected for having one or more of the following qualities: population greater than 75,000; being within 2 hours of a major capital city; having experienced recent rapid growth, economic diversification; known to be a planned growth area or; connected to planned national connectivity infrastructure.

A significant gap in Western Australian data involves a coordinated evaluation framework for project design proposals across a range of scales. This could provide a consistent evaluation approach across a range of performance criteria and would be able to report on the mitigation and adaptation potential of different scenarios.

The Australian Urban Design Research Centre (AUDRC) has developed a base set of evaluation metrics which can be applied to test and evaluate spatial projects and plans against different climate change scenarios. The *Planning Support Tool* and *Co-design* interface for community and stakeholder engagement currently under development promises to provide a consistent and flexible platform for reporting, optimisation and refinement of spatial plans and projects.

Community participation, collective planning, and co-designing liveable urban solutions are essential for ensuring buy-in among residents in urban centres and rural towns. This may entail where to locate urban gardens and roof-top cooling, bicycle lanes, etc. Encouraging examples are the White Gum Valley project²⁰ and the City of Stirling's Forest Plan²¹.

¹⁹ Australian National Outlook 2019 Technical Report, <https://www.csiro.au/en/Showcase/ANO>

²⁰ <https://www.landcorp.com.au/Residential/White-Gum-Valley/>

²¹ <https://www.stirling.wa.gov.au/your-city/documents-and-publications/waste-and-environment/urban-forest-plan>

Issue 11: Strengthening adaptive capacity

Strengthening adaptive capacities is the cornerstone of safer, healthier, and more resilient communities as well as liveable towns and cities. However, the Issues Paper remains centred on the role of the WA Government in “providing tools, guidance, and accurate information”, suggesting that capacities will increase with better knowledge and information (p. 27). This approach fails to notice other, arguably more important aspects of enhancing adaptive capacities, which are two-fold:

First, it requires a detailed understanding of which individuals, groups, and sectors are most vulnerable and why, how these vulnerabilities can be overcome, and what specific needs and aspirations each group or sector wishes to prioritise (see Section 6 regarding the need for a detailed vulnerability profile for the State).

Second, adaptive capacity is rarely enhanced through a one-off information session and/or the delivery of accessible and up-to-date climate science. In fact, adaptation is now best understood not as a suite of adaptation strategies but as adaptation pathways. The IPCC Special Report on 1.5°C Global Warming defined adaptation pathways as “a series of adaptation choices involving trade-offs between short-term and long-term goals and values (Reisinger et al., 2014). They are decision-making processes sequenced over time with the purpose of deliberating and identifying socially salient solutions in specific places (Barnett et al., 2014; Wise et al., 2014; Fazey et al., 2016). There is a range of possible pathways for transformational change, often negotiated through iterative and inclusive processes (Harris et al., 2017; Fazey et al., 2018; Tabara et al., 2018).” (Allen et al. 2018²²). Chapter 5 of the same IPCC report (Roy et al. 2018²³), co-led by UWA Professor P. Tschakert, provided evidence (p.458) that “choices between possible pathways, at different scales and for different groups of people, are shaped by uneven power structures and historical legacies that create their own, often unforeseen change (Fazey et al., 2016; Bosomworth et al., 2017; Lin et al., 2017; Murphy et al., 2017; Pelling et al., 2018)”. Moreover, adaptation pathway thinking, rather than providing information alone, “allows for identifying local, socially salient tipping points before they are crossed, based on what people value and trade-offs that are acceptable to them (Barnett et al., 2014, 2016; Gorddard et al., 2016; Tschakert et al., 2017)”. Yet, it is also well known that dominant pathways “tend to validate the practices, visions and values of existing governance regimes and powerful members of a community while devaluing those of less

²² Allen, M.R., O.P. Dube, W. Solecki, F. Aragon-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld, 2018: Framing and Context. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Portner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Pean, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]

²³ J. Roy, P. Tschakert, H. Waisman, S. Abdul Halim, P. Antwi-Agyei, P. Dasgupta, B. Hayward, M. Kanninen, D. Liverman, C. Okereke, P. F. Pinho, K. Riahi, A. G. Suarez Rodriguez, 2018, Sustainable development, poverty eradication and reducing inequalities supplementary material. In: Global warming of 1.5°C. A IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Portner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, R. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)].

privileged stakeholders” (p458). The same chapter concluded that “positive outcomes emerge when adaptation pathways (i) ensure a diversity of adaptation options based on people’s values and the trade-offs they consider acceptable, (ii) maximize synergies with sustainable development through inclusive, participatory and deliberative processes, and (iii) facilitate equitable transformation. Yet such pathways would be difficult to achieve without redistributive measures to overcome path dependencies, uneven power structures, and entrenched social inequalities” (p447).

Such pathways, as suggested by the IPCC Special Report (2018), require iterative problem-solving and decision-making processes where trade-offs are deliberated and resilience is negotiated (Figure 6). Local governments may not be best placed, as the Issues Paper suggests (p 28), to identify the adaptation needs of local communities (nor the many different ways in which they, and the individuals that form them, make trade-offs between the many things they value and wish to protect in the face of slow climate emergencies and extreme events).

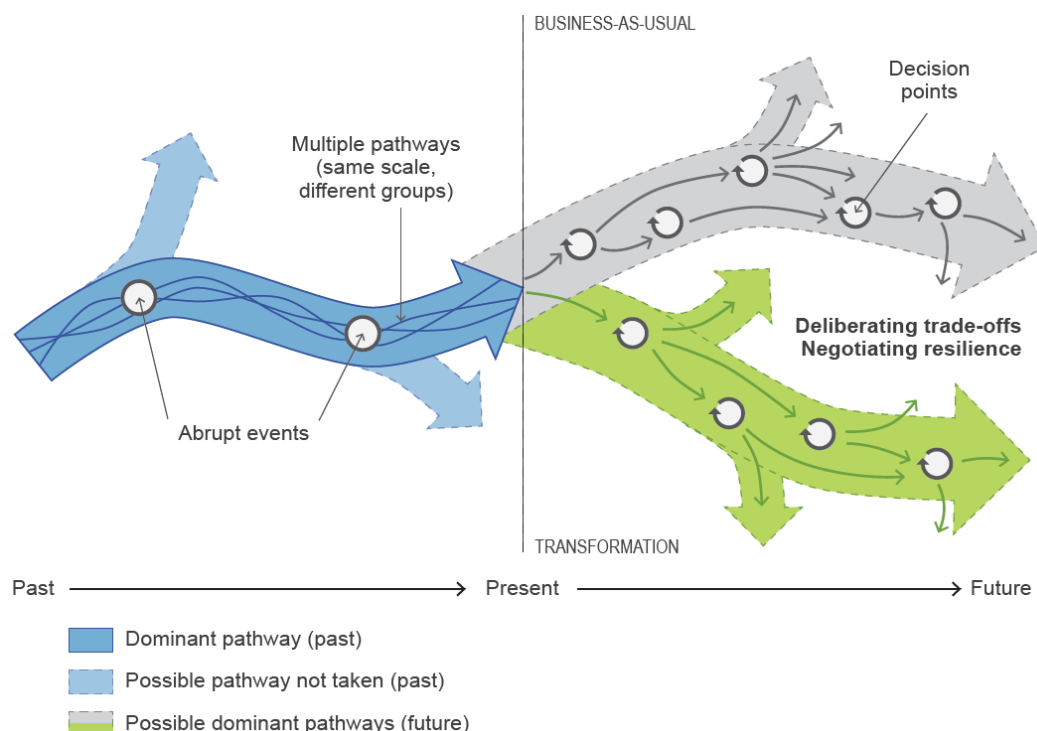


Figure 6: Pathways into the future, with path dependencies and iterative problem-solving and decision-making processes.

While the National Disaster Risk Reduction Framework (2018) recommends empowering various constituencies (p17) and ownership of locally-led and place-based risk reduction efforts (p 19) (Table 2), it is the Profiling Australia’s Vulnerability report (2018) that emphasises the crucial role of values and trade-offs in making adaptive decisions (p32) and the vital steps for disaster risk reduction (mirroring the notion of ‘minimising harm’ in the Issues Paper, p. 27) (Figures 10 and 11) with strong overlaps with enhancing adaptive capacities, called “pathways to safety” (p45).

Table 2: Examples of Priorities 2 and 3 strategies for action, 2019-2023²⁴

<p>STRATEGY F</p> <p>Empower communities, individuals and small businesses to make informed and sustainable investments</p>	<p>Communities and individuals can own their role as informed and active investors in disaster risk reduction, subject to their capacity, capability and financial position, to their own benefit and the benefit of their broader networks and economies. This requires communities to be supported to understand disaster risks and impacts relevant to what they value and the choices they make. It is essential to identify what support may be needed by those with limited capacity and capability to act as an informed investor.</p>
<p>STRATEGY C</p> <p>Support and enable locally-led and owned place-based disaster risk reduction efforts</p>	<p>Where disaster risks are location-specific, governments and other relevant sectors should support local ownership and delivery of place-based disaster risk reduction and resilience measures.</p>

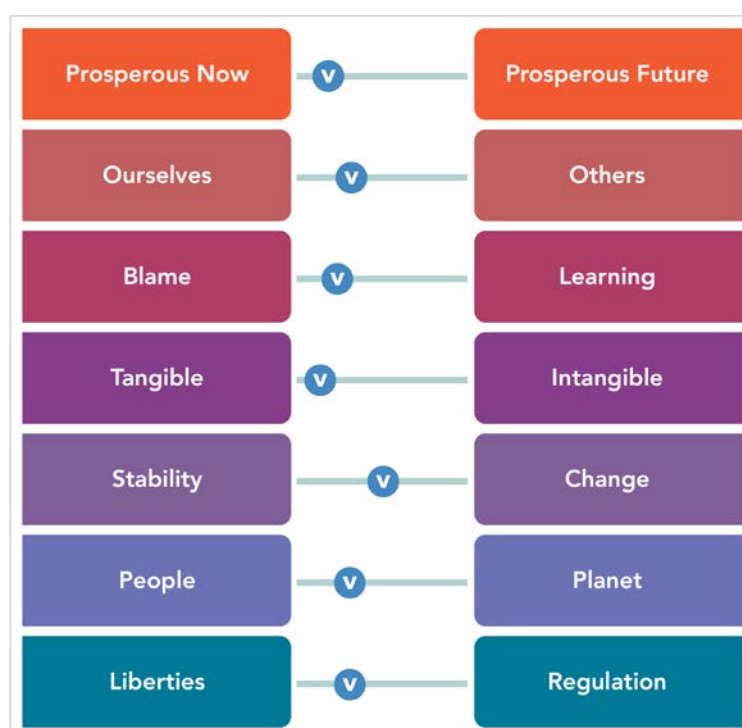


Figure 7: Choices and trade-offs are necessary for values that are in tension and cannot be reconciled at the same time²⁵.

²⁴ <https://www.homeaffairs.gov.au/emergency/files/national-disaster-risk-reduction-framework.pdf>

²⁵ <https://www.aidr.org.au/media/6682/national-resilience-taskforce-profiling-australias-vulnerability.pdf>

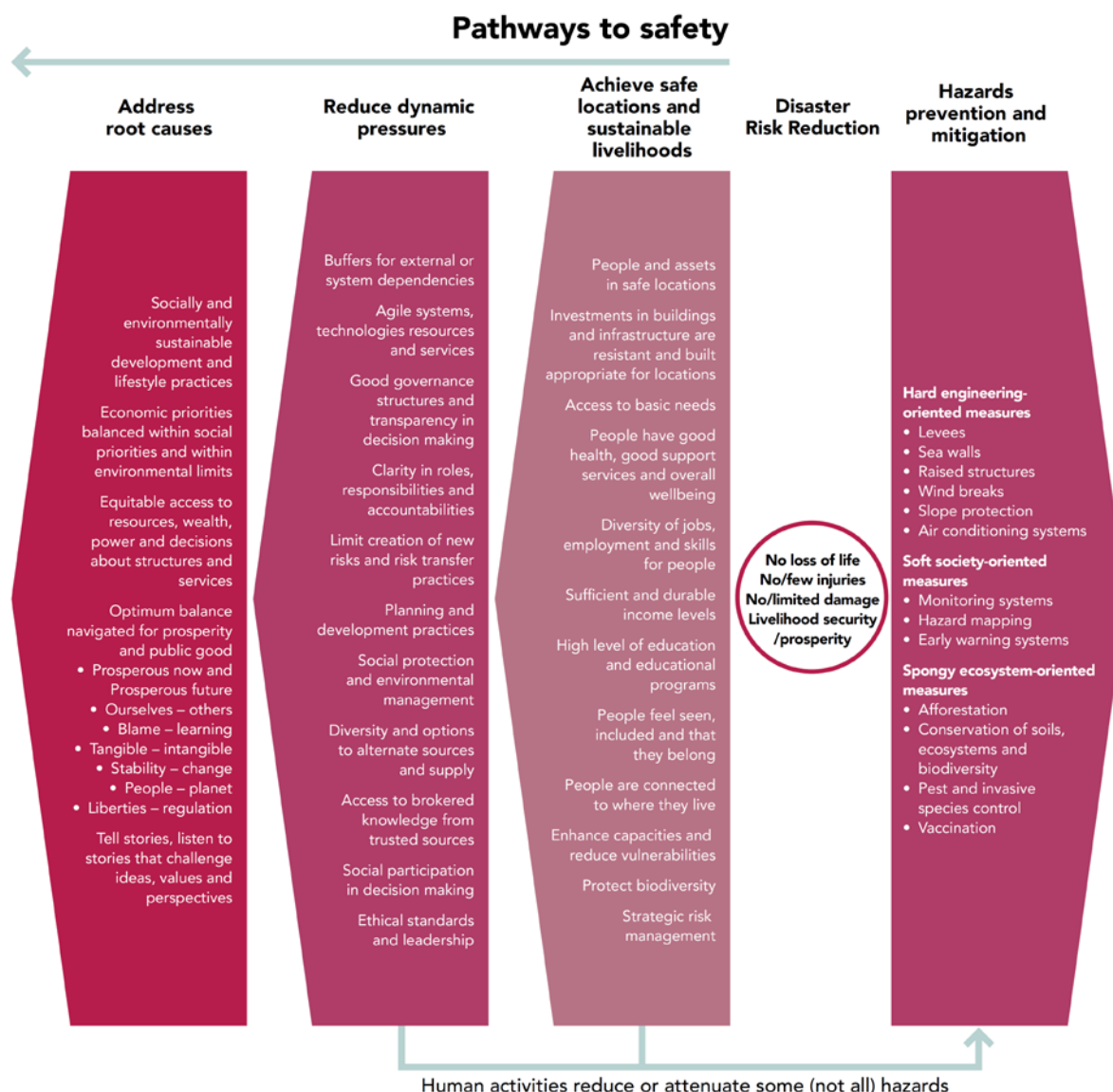


Figure 8: The pathway to safety, with aspects to enhance or increase. The figure is illustrative, not comprehensive, in conveying systematic vulnerabilities²⁶.

Despite these substantial advances of how adaptation pathways are now understood, incl. the role of deliberating value trade-offs, and how such pathways mirror pathways to safety to reduce risk from climate-related hazards and poor governance disasters, specific data for WA is lacking with respect to best practices for a variety of different stakeholder groups, including the most disenfranchised.

UWA researchers offer insights into how to identify what WA communities value and what they desire to strengthen their adaptive capacities. One example is the Australian Research Council Discovery Project “Locating Loss from Climate Change in Everyday Places”, led by Prof Petra Tschakert. This study investigates climate change and other stressors across eight communities in WA, from south of Perth into the eastern Wheatbelt, to understand what is valued, by whom, and why, and how urban and rural residents make difficult trade-offs when

²⁶ <https://www.aidr.org.au/media/6682/national-resilience-taskforce-profiling-australias-vulnerability.pdf>

negotiating climate change futures, including impacts on their health, well-being, identity, and sense of place and belonging, and how their visions for desirable and dignified futures can be incorporated into state-level adaptation planning.

Psychological issues

There is a wide range of psychological issues related to climate change and climate action. Apart from the fact that climate change is having, and will continue to have, substantial direct and indirect mental-health impacts²⁷, we will focus here on the issues relating more directly to climate action. While these issues are not specific to Western Australia, they will be important to consider in the local context.

Climate action continues to encounter strong resistance from industries and individuals with vested interests, who run global and local disinformation campaigns to delay mitigation.²⁸ Thus, any climate campaign will need to consider how to debunk misinformation using well-designed interventions²⁹ and how to inoculate consumers against future misdirection by exposing misleading argumentation strategies.³⁰ Climate change education should thereby go hand in hand with the implementation of information literacy interventions that enhance resistance to disinformation.³¹

Against this backdrop, communicating the realities of climate change presents challenges that require a careful and strategic approach. One key factor that can help overcome so-called climate “scepticism” is the communication of the scientific consensus on climate change, which can act as a gateway belief.³² A second broad factor concerns the communication of risks and uncertainties: To avoid despair and disengagement, communications should not catastrophize, while also not understating risks.³³ Uncertainties around climate predictions need to be communicated in a manner that makes certainties clear, and emphasizes the fact that uncertainty can mean things will be worse than expected.³⁴ In this context, it will also be important to alleviate fears of personal economic loss (e.g., by pointing to successful transitions elsewhere and framing change in terms of creation of jobs and opportunities rather than losses of jobs or taxes), and to highlight the fact that costs grow over time, so not investing now comes at great risk of future loss.³⁵ Relatedly, it will be useful to frame the costs of reducing Australia’s emissions in terms of foregone-gains rather than actual losses: tackling climate change means average incomes can still rise in the future—just not by as much as if we continue with business-as-usual.³⁶ It is also important to understand that people are often more strongly motivated by personal experiences rather than statistical descriptions of the risks of climate change. Accordingly, targeted communications should highlight relevant personal experiences through affective recall, stories, and metaphors.³⁷ A further barrier

²⁷ e.g., <https://www.nature.com/articles/s41558-018-0092-2>; and <https://www.ncbi.nlm.nih.gov/pubmed/21447547>

²⁸ Oreskes, N., & Conway, E. M. (2011). *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Publishing USA.

²⁹ e.g., <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0210746>

³⁰ e.g., <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0175799>

³¹ e.g., <https://www.nature.com/articles/s41599-019-0279-9>

³² e.g., <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0118489>

³³ e.g., <https://www.mdpi.com/2071-1050/8/1/6>

³⁴ <https://climateoutreach.org/resources/uncertainty-handbook/>

³⁵ e.g., <https://www.pnas.org/content/105/7/2291.short>

³⁶ e.g., <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0114335>

³⁷ e.g., <https://www.sciencedirect.com/science/article/abs/pii/S0959378006000847>

results from the fact that people tend to view climate change as being psychologically distant—something that will affect other people, in other places, in the future. Accordingly, climate communicators should emphasise the present and make climate change impacts and solutions locally relevant.³⁸ In general, trusted messengers (e.g. farmers, firefighters, scientists, doctors, influencers) or surprising messengers (insurers, people with links to fossil fuel industry) should be used (rather than politicians) as much as possible.³⁹

Apart from communications design, additional steps need to be taken to overcome psychological barriers to behaviour change. These will include appealing to people's legacy motivation in order to reduce temporal discounting (based on the impression that negative impact is a long way in the future), focusing on the notion that no one wants to be a burden to future generations⁴⁰, and creating strong social norms that emphasize that taking action is the right thing to do (i.e., an injunctive norm) and supported by the majority of West Australians (i.e., a descriptive norm)⁴¹. It will also be important to remember that humans are motivated by both intrinsic (desire to fulfil personal values) as well as extrinsic (desire for external rewards) factors. Climate policies tend to be grounded in short-term extrinsic incentives only, but should ideally be accompanied by intrinsic appeals to fulfil valued long-term environmental goals.⁴² At the same time, as many will continue to deny (or be agnostic about) the evidence, appropriate incentive structures and behavioural “nudges” will remain important tools.⁴³

UWA researchers can provide expertise around the communication of climate change, dealing with disinformation campaigns, and implementing behavioural change. For example, a project supported by the Australian Research Council on “Combating Misinformation – Designing a Toolkit to Address a Global Problem” (led by A/Prof Ullrich Ecker at the UWA School of Psychological Science) will be launched in 2020, and will provide new insights and practical recommendations on how to navigate communications and policy implementation in an informational landscape characterized by disinformation and uncertainty.

Contact for follow up or further information:

David Norman
Senior Policy Adviser
Vice-Chancellery
The University of Western Australia


³⁸ e.g., <https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00230/full>

³⁹ e.g., <https://journals.sagepub.com/doi/10.1177/1075547012441691?icid=int.sj-full-text.similar-articles.2>

⁴⁰ e.g., <https://journals.sagepub.com/doi/abs/10.1177/0956797614561266?journalCode=pssa>

⁴¹ e.g., <https://journals.sagepub.com/doi/abs/10.1177/0146167208316691>; and <https://www.sciencedirect.com/science/article/pii/S0272494412000412>

⁴² e.g., <https://www.nature.com/articles/nclimate2669>

⁴³ e.g., <https://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.p20151049>