Learning from Dual Global Crises: COVID-19 and climate change

CLAUDIA BALDWIN AND KATHRYN ENGLISH

This article compares two concurrent global crises: the decades-long climate change crisis and the months-long COVID-19 pandemic. These have many similarities. We draw attention to seven parallels and implications. Three of these feature change: business as usual is not acceptable; timeliness in relation to tipping points is critical; and communities can adapt to change with support. Two other points highlight the importance of data: decisions about policy, planning and management need to be based on evidence; and preparation needs to be based on expert advice, warnings, and long-term strategies. Two additional comments involve institutions and relationships: integrated multi-level governance is most effective to deal with global crises; and a sense of a shared burden on humanity globally is essential. We learn that adaptation can take place without having all the facts but accepting the trends, timing is critical, and political will is vital.

KEY WORDS: COVID, climate, policy, governance, humanity.

The world is facing concurrent global crises: decades-long climate change and the months-long novel coronavirus SARS-CoV2 causing the COVID-19 pandemic. Considering the similarities and differences in the phenomena and the global responses may reveal opportunities for better outcomes in the lengthy process ahead. Both dynamic catastrophes present multi-dimensional challenges that, if not mitigated, are projected to reap unimaginable devastation to life as we know it. However, COVID-19, with its potential to cause millions of deaths in a short time, has the immediacy of response not yet granted to climate change. Addressing the climate dilemma over a longer period has enabled countries to establish global governance structures not currently coordinated in the nascent coronavirus emergency.

The World Health Organisation (WHO) declared the COVID-19 outbreak as a Public Health Emergency of International Concern on 30 January 2020, upgrading its status to a pandemic on 11 March 2020. A pandemic is an epidemic of infectious disease that has spread through human populations across a large region, multiple continents, or even worldwide. It affects nearly all people and causes a high degree of morbidity and mortality. Within four months, COVID-19 resulted in 200,000 deaths globally (WHO 2020b).

Climate change was declared a serious threat to humankind with publication of the first scientific assessment report by the Intergovernmental Panel on Climate Change (IPCC) in 1990. It will leave no continent untouched and is already implicated in an estimated 150,000 fatalities per year, totalling millions of deaths so far world-wide (WHO 2020c). It is not an infectious disease so is not considered a pandemic, however, there are similarities between the massive human impacts of COVID-19 and climate change.

We explore some parallels and implications of learnings from our experience with the COVID-19 pandemic, that we could draw on in addressing climate change.

1. Business as Usual is not Acceptable

The risks and consequences in both cases are too high, and unacceptable to the public. Failure is unthinkable. Events are unprecedented. A key driver (impetus) for change is the fear of uncertain but imaginable (and often modelled) risks and consequences, both short and long term.

COVID-19

The risk is substantial to the health of the population and results in increased morbidity and mortality among people of all ages, not just of 'vulnerable' cohorts (the aged and people with pre-existing medical conditions). The potential outcomes are so serious that the public has made major changes to everyday social and economic practices in a short time.

Climate change

The risks are steadily increasing, with human, environmental and financial consequences. Increased severity of heat waves and urban heat island effects have contributed to increased mortality of vulnerable cohorts (the aged, infants, and people with disabilities) (Astrom et al. 2013). A reminder that warming oceans have increased strength and frequency of cyclones (IPCC 2014; 2019b) was evidenced by the 8 April 2020 Cyclone Harold devastating Vanuatu and its South Pacific neighbours that was more severe than anticipated. Extreme rainfall in 2011-12 affected more than 78% of Queensland and contributed to catastrophic flooding and 33 deaths (Queensland Government 2012). Furthermore, the unprecedented scale of bushfires in southern Australia in 2020 caused 34 deaths, significant loss of property and biodiversity, with hazardous smoke extending air pollution into cities (SBS 2020). These events have potential long-lasting impacts on mental and physical health. Importantly, the reality of extreme events increasing and becoming more severe with climate change, is affecting public anxiety, to a point where people are willing to make changes.

2. Timeliness in Relation to Tipping Points is Critical

Both global crises have timeframes which could lead to overwhelming devastation. Tipping points represent irreversible shifts in a given system due to thresholds being crossed (Lemoine and Traeger 2014). Once these thresholds are crossed, the system dynamics change and are irreversible even after attempts at returning variables to a pre-threshold state (Ibid). This results in a regime shift in system dynamics and 'sudden, high-amplitude, infrequent events, which are detectable in multiple aspects of the physical and biological components [of a system] and on large spatial scales' (Armitage et al. 2011:106). Moreover, cascading effects can compound social, environmental and economic impacts, in particular where multiple shocks occur one after the other.

COVID-19

Evidence is that those countries that enacted social distancing, social isolation/'shelter-at-home', and contact tracing strategies early, closed borders, and facilitated maintaining communication through alternative means, have been able to slow down the number of new infections and reduce the projected demand on health facilities. Hence some countries are now at the stage of 'flattening the curve' and easing restrictions, ultimately, reducing the number of infections to a level that prevents further spread. Those that did not take early and strong action such as the USA, Brazil and Russia, reached a tipping point, where basic human health and physical infrastructure for human survival cannot cope, causing

spill over or cascading effects: families devastated by loss of loved ones, people refused over-run health services and needing to find help away from their home community. Death is finite: there is no return to 'normal' for someone who dies, or who loses family or friends. Other human losses have cascading effects on family income, mental health, and care relationships.

Climate change

While climate change is already having effects, projections are that if the temperature increases 1.5°C above pre-industrial levels (we are currently 1°C above), there will be increased extreme temperatures on land, temperature rises in oceans, increased frequency and intensity of heavy precipitation, droughts, and sea-level rises. Thresholds or tipping points will be reached with long-lasting or irreversible effects on ecosystems, food security and water supply (IPCC 2018). Some projections indicate that the Great Barrier Reef is reaching a tipping point (see below).

3. Decisions About Policy, Planning and Management Need to be Based on Evidence

We need to trust the scientific process, communicate clearly, and encourage an informed public that is discerning enough to know the difference between facts, opinions and 'fake news'. We need to reflect, review and revise our plans based on evidence, in line with 'adaptive management'. Successful governance responses should include: timely policy making and adoption of appropriate rules; the ability to address intergenerational equity and a focus on rights as well as responsibilities. Also needed are connectivity and collaborative decision-making and integrated trans-national multi-level spatial governance, as well as adaptability and transformability (Serrao-Neumann et al. 2016).

COVID-19

By early February 2020, the disease emanating from the novel coronavirus (SARS-CoV2) was declared a legally notifiable disease in all States and Territories in Australia, as well as in all countries across the globe. Such mandatory reporting facilitates tracking the spread of infection rates globally to understand who are most affected, how it spreads, and how to contain it. In March 2020, WHO announced a broad consensus on a coordinated Global Research Roadmap, with priority given for diagnostic testing, vaccine development and therapeutics (WHO 2020a). Sampling and tracing techniques, while under development, are improving, but are not keeping pace with the scope and scale of the disease. As understanding of the virus continually improves, more questions arise about: deaths of healthy

people; role of asymptomatic carriers; time for recovery; effects on unborn children whose mothers were affected; chronic complications on children; appropriate treatment; and the ability to achieve national and world-wide immunity or eradication. The responses by governments globally have been, and remain, inconsistent, with at times, illogical rules, mixed messaging, and an initial delay in a coordinated information and outreach effort from key credible authorities. Several countries, especially those with federal systems, have had a plethora of problematic and contradictory messaging. Because of this, rumours of unproven treatments abound, and false hope, often spread through social media, were given by high profile individuals in government and the media, some proclaiming a premature end to the crisis and a return to 'normal'. Misinformation undermines social good. On the whole, the Australian community appears to have implemented and followed high compliance with restrictions, possibly due to some measures of income support (Bodas and Peleg 2020).

Climate change

The IPCC 5th assessment report confirmed that warming of atmosphere and oceans is unequivocal, and likely to exceed 1.5°C due to the lock-in effect. More than 800 scientists, drawing on 12,000 scholarly articles, produced the 2600-page consensus report, reviewed by 500 people including experts and officials from 115 countries and approved by nearly 200 governments (IPCC 2014). Regular monitoring and reporting by agencies around the world monitor greenhouse gas emission trends according to National Inventory Guidelines (IPCC 2019a), although not all contributing factors are included (e.g. CO2 from bushfires). A 2018 IPCC special report confirmed that we are already seeing consequences of an increase of 1°C global warming in terms of extreme weather and diminishing Arctic sea ice. The report warned that limiting global warming to 1.5°C requires rapid transitions in land use, energy, industry, buildings, transport and cities, to achieve net zero CO2 emissions by 2050 (IPCC 2018).

While scientific consensus is clear, policy changes have been more difficult to achieve. The UN Framework Convention on Climate Change (UNFCCC) was established in 1992 with 197 signatories and a commitment to hold annual conferences of parties (COP). The Kyoto Protocol (1997), a treaty to reduce greenhouse gas emissions, did not come into effect until 2005 and individual country policy and financial commitments to achieve targets have been slow. In spite of the scientific consensus, climate deniers still have a voice, making it a challenge to dispel 'easy fixes'. On a reassuring note about changing attitudes, though, a 2019 survey of the Australian public indicated that 81% of participants are concerned that climate change will result in more floods

and droughts (Merzian et al. 2019). The Australian government has called for a 'lessons learned' inquiry into the 2019-20 bushfire season. The terms of reference are comprehensive in seeking to understand the level of advice provided prior to the bushfire season and 'adequacy of the Federal Government's existing measures and policies to reduce future bushfire risk, including in relation to assessing, mitigating and adapting to expected climate change impacts' (Finance and Public Administration References Committee 2020: 1). However, it remains to be seen if it will motivate change. In terms of reflecting on and revising plans based on evidence, a meta-analysis of recommendations of 55 Australian post-disaster-event reviews and inquiries since 2009 found 32 recurrent themes, including about policy, legislation and land use planning (Cole et al. 2018). Reviews can guide reflection and evaluation of whether previous methods of preparation and mitigation have worked or will work in the future. Yet there is no indication of how many of those recommendations have been implemented including outcomes from the *Queensland Floods Commission of Inquiry 201*2. Reviews can provide insight into whether previous attempts at mitigation will have to be adapted for the future. For example, in a drying climate, the reduced safe time available for fuel reduction burns may require different approaches to mitigating bushfire risk (Baldwin et al. 2020).

4. Preparation Needs To Be Based On Expert Advice, Warnings, and Long-Term Strategies

Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters, including slow onset or rapid effects, and taking account of cascading and interactive effects.

COVID-19

As early as 2007, the Bill & Melinda Gates Foundation injected massive funding into research on high risk infectious disease (Matthews and Ho 2008) and in 2015, Bill Gates warned of a lack of progress in pandemic preparedness, predicting a breakdown of supply chains and overloading of many systems (Gates 2015). Gates recommended national reserves of medically skilled people and supplies, tied to the military in order to take quick action; more simulations and vaccine research, as well as safe health systems in poor countries to improve global health equity. Furthermore, an adequate publicly available health care system and an emphasis on disease prevention can reduce mortality and economic costs of illness and mortality (DeVol et al. 2007). At the time of writing this article, two million Americans have been infected, with over 115,000 deaths attributed to COVID-19 (WHO 2020b). On a positive note, good planning can make a difference – coordinated plans for the management of influenza in residential aged care

facilities, supported by the Australian government since 2014, have helped these facilities to quickly put in place procedures to deal with COVID-19.

Climate change

Each IPCC report since 1990 has warned of increasing risks from climate change. Garnaut (2008: 118) reported that more intense fire seasons 'should be directly observable by 2020'. In early 2020, the Australian federal government pledged to commit additional emergency and fire-fighting resources, such as for aerial fire-fighting capacity, to be better tailored to predicted fire behaviour (Readfearn 2020). Prevention is always less expensive than recovery. According to Deloitte Access Economics (2016: 2), in 2015, the total economic cost of natural disasters in Australia exceeded AU$9 billion and is expected to rise to an average of $33 billion per year by 2050. They estimate that targeted investment in resilience would reduce Australian government expenditure on natural disaster relief and recovery by more than 50% by 2050. Waiting until there is an impact is too late for comprehensive management. Examples include building on floodplains then expecting dams to be constructed to mitigate predictable flooding (Cook 2020). Not having a fire plan or fire shelter in a bushfire prone area limits options. An increase in temperatures can cause heat stress and a range of vector-borne diseases such as dengue fever. A well-resourced equitable healthcare and emergency service system can adapt synergistically to rapidly increasing demands from disease and climate change.

5. Integrated Multi-Level Governance is Most Effective

Researchers globally have emphasised that alignment, cooperation and collaboration among the hierarchy of national, state and local governments, and across government agencies is essential for effective policy development and management of complex problems, including for disaster preparedness (Grafton et al. 2013). Responsibilities need to be clearly delineated, with unambiguous messages consistent at all levels. Transparency is essential to achieve trust and compliance; we cannot operate in silos. Community engagement and feedback about feasibility of measures can improve rule-making and compliance (Ostrom 1990; OECD 2016). Responses are costly, with long-term budget implications. Increased centralised decision-making with no broad oversight in times of emergencies is a threat to, and an erosion of, principles of democracy, freedom and privacy.

COVID-19

The delay in arriving at a consistent response within countries, including across states, local governments, institutions and workplaces, has affected the timeliness of the uptake of quarantine and social distancing measures, not just in Australia, but more severely in other countries. Confused, inconsistent and illogical messages are ignored with common sense prevailing in some cases: insisting that children are safe attending schools whereas employees need to work at home saw many parents withdraw students from schools and child care centres well in advance of it being mandated by government; or restricting testing to those who have had overseas contact without explanation that the real reason was due to a lack of supplies. Widespread testing is axiomatic to understanding community spread of the disease. On 8 April 2020, the Australian Parliament was initially suspended until August 2020 and the Parliament agreed to a cross-party Senate committee having oversight of COVID-19 decision-making and expenditure to ensure accountability. A 'National Cabinet' of First Ministers was instituted and the Prime Minister recently admitted that this replacement for COAG was a successful mechanism for collaboration. As the pandemic eased in Australia, Parliament has again met with reduced numbers present to ensure social distancing. Increasing concern is being expressed globally about autocratic countries using centralised decision-making about COVID-19 and personal tracking devices to enforce physical restrictions and clamp down on political opponents to limit dissent (Tham 2020).

Climate change

With gaps existing in policy at the national level, Australian states and particularly local governments (expecting to feel the brunt of climate disasters) are making their own policies for dealing with climate change. But a national approach is needed for mitigation to reduce greenhouse gas emissions (GGE), to support comprehensive adaptation measures, as well as coordination mechanisms for dealing with disasters. These should include national sharing of fire-fighting resources along with the coordination of food, water, and fuel supplies.

Integrated risk assessment of cumulative impacts is needed, for example to prepare for what might happen in the case of telecommunications breakdown due to damage to infrastructure, an internet 'virus', or increased load on the system. The current review of the Commonwealth *Environmental Protection and Biodiversity Conservation Act*, which is the vehicle for implementing Australia's international environmental responsibilities, provides an opportune time for including climate change in the goals of the Act as well as matters of national environmental significance. It should be noted that other countries have specific national climate change legislation.

6. Communities Can Survive Change: We can adapt with support

Communities can be resilient, when resilience means coping with change, and transitioning to a 'new normal' in an adapted future, while not returning to a previous state (Davidson et al. 2016). However, a transition strategy needs to consider how to ease the pain and help people to adjust. Major catastrophic events do not discriminate between rich and poor, though the rich and privileged have access to more resources to prevent, mitigate, adapt, and recover from the effects. Hence, social justice is a core principle, and public resources need to be allocated to prevent socially unacceptable impacts on individuals, especially the most disadvantaged.

COVID-19

Technology has been a critical vehicle for enabling much of the economy, including education, to continue. We can teach and learn online. We can be trusted to work productively at home and save time, costs and GGE without the daily commute – telecommuting is emerging as the saviour for many. We appreciate having access to local and Australian products, since imports have reduced. Further, those who have lost jobs can use time and government support to retrain. Yet a digital divide is apparent. While imaginative solutions abound (e.g. home adaptations of personal protection gear), we need to be aware of the technologically disadvantaged. Change can be uncomfortable – being unemployed is stressful; social disconnection through working or staying at home can be lonely; insufficient exercise is also a concern. A government injection of resources has been essential for dealing with unemployment, to help businesses survive, and to provide emotional and well-being support.

Climate change

Technology, while important, is only one of the mitigation mechanisms to the multifaceted climate dilemma. Relying on technology solely to solve such complex issues as climate change is unrealistic. However, technology has an important role to play: investment in clean power, SMART transport, less interstate and international travel for meetings and remote working will assist in lowering GGE. Some changes are uncomfortable, for example learning to use video conferencing or home schooling. The benefits in local supply networks to reduce carbon miles may result in reduced food options. Adaptation planning is needed to avoid cascading effects of climate change and maladaptation. Not changing may be even more uncomfortable. For example, lack of vegetative canopy reducing heat in housing can contribute to heat stress (Baldwin et al. 2020) but business as usual adding air-conditioning is maladaptive. Not changing our path may affect shelter, food and health, especially for the poorest and most vulnerable. Disasters and unplanned events can act as poverty multipliers (Hallegatte et al. 2015): poorer people are more exposed to pollution and burning of fossil fuels.

7. A Sense of Shared Humanity Globally is Essential

Health workers, emergency responders, and the care army created in some states dedicate themselves to protecting others in emergencies and become heroes but post-event trauma can be significant for many of these frontline workers and for many marginalised people who are severely affected. Social justice needs to be an enhanced guiding principle.

COVID-19

It will not be eradicated or managed effectively without global cooperation. Travel restrictions, self-isolation, research and immunisation rely on collaboration. Local achievements will be discounted if others do not do their part. WHO has an important role to play to ensure that benefits and costs are appropriately shared. Communities around the world are demonstrating care for others by restricting contact. Health workers are putting themselves at risk, particularly where protective resources are limited.

Climate change

To effectively address climate change and mitigate its effects requires a global response across developed and developing countries. While frameworks exist, collective efforts fail to address the accelerating causes and impacts. If temperatures increase by more than 1.5°C, up to 90% of the corals in Australia's Great Barrier Reef will die (IPCC 2018). Adjacent hinterland efforts in north Queensland to reduce nutrient and sedimentation flowing into the Barrier Reef from agriculture will make little difference to its survival under these circumstances.

In environmental crises, emergency service personnel place themselves in dangerous situations to protect lives and property, but it takes a toll on health and wellbeing. Australians and others across the world have demonstrated great empathy for those affected by disasters with a reported more than AU$100 million raised to support Australia's 2020 bushfire victims within one week (Brown 2020). In spite of the powerful interests that support retaining the *status quo*, if the community is more afraid of the consequences of no change, then fear may spur actions to overcome intransigence.

Conclusion

The overwhelming worldwide and Australia-wide media and political attention on COVID-19 has overshadowed attention on international disasters, such as the April 2020

South Pacific cyclone and Australia's unprecedented bushfires. Yet more deaths have already occurred in Australia attributable to climate change than COVID-19. This fact is often overlooked due to the regular but episodic occurrence of natural disasters, compared to the current death rates from COVID-19 in a short period. While unparalleled, continuing disasters from climate change should be expected; we have been warned. Taking action against climate change involves a modest cost compared to the increasing costs of inaction.

Just as Ebola was a wake-up call, episodic disasters due to climate change mean that time is not on our side, although we are getting better at managing the personal and business disruption due to rapid onset disasters. But communities and countries will find it harder to recover if one shock follows soon after another. There is however great potential for improvement in mitigating impacts by focusing on the long-term. Political will, with public support, knowledge gained from research, practice, and review of events can enable us to turn COVID-19 and the recent bushfire crises into windows of opportunity for the systemic change needed for global health and intergenerational equity.

References

Armitage A. Marschke M. and van Tuyen T. 2011 'Early stage transformation of coastal marine governance in Vietnam', *Marine Policy*, 35: 703-711.

Astrom D. Forsberg B. Ebi K. and Rocklov J. 2013 'Attributing mortality from extreme temperatures to climate change in Stockholm, Sweden', *Nature Climate Change*, 3, 12: 1050-1054.

Baldwin C. Byrne J. and Matthews T. 2020 'Planning for older people in a rapidly warming and ageing world: the role of urban greening', *Urban Policy and Research*. Forthcoming.

Baldwin C. and Ross H. 2020 'Beyond a tragic fire season: a window of opportunity to address climate change?' *Australasian Journal of Environmental Management*, 27, 1: 1-5.

Bodas M. and Peleg K. 2020 'Self-Isolation Compliance in the COVID-19 Era Influenced by Compensation: Findings from a Recent Survey in Israel', Health Affairs https://doi.org/10.1377/hlthaff.2020.00382 (accessed 26/04/2020).

Brown N. 2020 'Biggest donations to Australia's bushfire relief', *News.com.au*. 15 January 2020 https://www.news.com.au/technology/environment/biggest-donations-to-australias-bushfire-relief/news-story/c627f699dece2cad5c8faf4a388d0813 (accessed 24/04/2020).

Cole L. Dovers S. Gough M. and Eburn M. 2018 'Can major post-event inquiries and reviews contribute to lessons management?' *Australian Journal of Emergency Management*, 33, 2: 34- 39.

Cook M. 2019 *A River with a City Problem: a History of Brisbane Floods*, University of Queensland Press, St Lucia.

Davidson J. Jacobson C. Lyth A. Dedekorkut-Howes A. Baldwin C. Ellison J. Holbrook N. Howes M. Serrao-Neumann S. Singh-Peterson S. and Smith T. 2016 'Interrogating resilience: toward a typology to improve its operationalization', *Ecology and Society* 21, 2: 27.

http://dx.doi.org/10.5751/ES-08450-210227

Deloitte Access Economics 2016 *Building resilient infrastructure*, March 2016 https://www2.deloitte.com/au/en/pages/economics/articles/building-australias-natural-disaster-resilience.html (accessed 24/4/2020).

DeVol R. Bedroussain A. Charuworn A. Chatterjee K. Kim IK. and Kim S. 2007 *An unhealthy America: The economic burden of chronic disease charting a new course to save lives and increase productivity and economic growth*, Milken Institute, Santa Monica.

Finance and Public Administration References Committee 2020 *2019-2020 Bushfire Commission Terms of Reference*. https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Finance_and_Public_Administration/Bushfirerecovery/Terms_of_Reference (accessed 23/4/2020).

Garnaut R. 2008 *The Garnaut Climate Change Review, Final Report*, Commonwealth of Australia.

Gates B. 2015 'The next outbreak? We're not ready'. TED Talk, April 3, 2015 https://www.youtube.com/watch?v=6Af6b_wyiwI (accessed 23/04/2020).

Grafton R. Pittock J. Davis R. Williams J. Fu G. Warburton, M., Udall, B., Mckenzie, R., Yu, X., Che, N. Connell D. Jiang Q. Kompas T. Lynch A. Norris R. Possingham H. and Quiggin J. 2013 'Global insights into water resources, climate change and governance', *Nature Climate Change*, 3, 4: 315-321

Hallegatte S. Bangalore M. Bonzanigo L. Fay M. Kane T. Narloch U. Rozenberg J. Tregue D. and Vogt-Schilb A. 2015 'Threat Multiplier: Climate Change, Disasters, and Poor People', *Shock Waves: Managing the Impacts of Climate Change on Poverty*, 79-110 https://doi.org/10.1596%2F978-1-4648-0673-5_ch3

IPCC 2014 *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland.

————— 2018 *'Summary for Policymakers', 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., Pörtner D., Roberts J., Skea P.R., Shukla A., Pirani W., Moufouma-Okia C., Péan 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.)].

————— 2019a 2019 Refinement to the 2006 IPCC *Guidelines on National Greenhouse Gas Inventories* (accessed 23/04/2020).

——— 2019b *Summary for Policymakers. In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [P.R. Shukla J., Skea E., Calvo Buendia V., Masson-Delmotte H.- O., Pörtner D. C., Roberts P., Zhai R., Slade S., Connors R., van Diemen M., Ferrat E., Haughey S., Luz S., Neogi M., Pathak J., Petzold J., Portugal Pereira P., Vyas E., Huntley K., Kissick M., Belkacemi and J. Malley (eds.)].

Lemoine D. and Traeger C. 2014 'Watch your step: optimal policy in a tipping climate', *American Economic Journal: Economic Policy* 6: 137–166.

Matthews K. R. and Ho V. 2008 'The grand impact of the Gates Foundation. Sixty billion dollars and one famous person can affect the spending and research

focus of public agencies', *EMBO reports*, 9, 5: 409–412. https://doi.org/10.1038/embor.2008.52

Merzian R. Quicke A. Bennett E. Campbell R. and Swann T. 2019 *Climate of the Nation 2019: Tracking Australia's attitudes towards climate change and energy, Research report*, The Australia Institute.

OECD 2016 'Northern Ireland (United Kingdom): Implementing Joined-up Governance for a Common Purpose', OECD Public Governance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9789264260016-en

Ostrom E. 1990 *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, Cambridge.

Queensland Government 2012 *Queensland Floods Commission of Inquiry*, www.floodcommission.qld.gov.au (accessed 23/4/2020).

Readfearn G. 2020 'Australian PM Scott Morrison agrees to permanently increase aerial firefighting funding' *The Guardian*, 4 January 2020. https://www.theguardian.com/australia-news/2020/jan/04/australian-pm-scott-morrison-agrees-to-permanently-increase-aerial-firefighting-funding (accessed 25/4/2020).

SBS 2020 'Australia Bushfire Smoke Travels 12,000 kms to Chile', *Dateline*, Special Broadcasting Service, January 7.

Serrao-Neumann S. Davidson J. Baldwin C. Dedekorkut-Howes A. Ellison J. Holbrook N. Howes M. Jacobson C. Morgan E. 2016 'Marine governance to avoid tipping points: can we adapt the adaptability envelope?' *Marine Policy* 65: 56-67.

Tham J. 2020 'Democracy remains essential in the COVID-19 pandemic', *The Canberra Times* http://www.canberratimes.com.au/story/6719936/democracy-remains-essential-in-the-covid-19-pandemic/ (accessed 25/04/2020).

WHO 2020a WHO R&D *Blueprint*, https://www.who.int/research-observatory/analyses/rd_blueprint/en/, (accessed 23/4/20).

————2020b Coronavirus (COVID-19) Dashboard, https://covid19.who.int/ (accessed 23/04/2020).

————2020c *The Health and Environment Linkages Initiative*, https://www.who.int/heli/risks/climate/climatechange/en/ (accessed 25/4/2020).

Authors

Claudia Baldwin PhD is Professor, Urban Design and Town Planning, and Co-director of the Sustainability Research Centre at the University of the Sunshine Coast where she has taught regional and urban planning since 2006. She uses participatory and visual methods to research institutional, policy, and social-environmental change on topics as diverse as water allocation, coastal planning, rural and regional land use, climate change adaptation, consensus-building and community resilience, as well as ability and age-friendly communities. She has published over 56 journal articles and four books. Several of her publications feature social justice including the edited book - Lukasiewicz A and Baldwin C (ed.), 2020. *Natural Hazards and Disaster Justice: Challenges for Australia and its Neighbours*, Palgrave Macmillan, Springer, Singapore. Issues about heat stress and seniors with climate change impacts resulted in 2019 article in *The Conversation* - http://theconversation.com/how-do-we-save-ageing-australians-from-the-heat-greening-our-cities-is-a-good-start-112613.

Kathryn English PhD is a researcher at the Sustainability Research Centre at the University of the Sunshine Coast where she has been lecturing in sustainability, climate change and community engagement since 2010. Her research interests, an outgrowth of her years working in environmental advocacy and government policy, focus on how individuals and groups understand and communicate their knowledge about climate change, adaptation and sustainability.

Daddy Bird

Remember

When dad would walk into the kitchen as daddy,
cupping a swallow that he had caught to carry
safely out of the shed and stopped to show us—

how the blackish feathers flashed with as many colors
from different angles as asphalt does, when it's covered
in spilled oil

& the way it lay still (for him),

baring its spot of band-aid-one-skin-tone-tan just
above its eyes, wings in a gentle nest of fingers,

that was either

warning or example,

resting a sharp beak right where daddy's day-old thumb
bandage was breaking loose into cotton plumage.

KATE ASSARIAN,
HARBOR BEACH, MICHIGAN, USA