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The real and present danger of climate change

In May 2016, the level of carbon dioxide (CO₂) measured at Cape Grim, on Tasmania's northwest coast, exceeded the crucial threshold of 400 ppm for the first time.¹ Cape Grim is one of only three World Meteorological Organisation ('WMO') global super-stations for the measurement of greenhouse gases. The exceedence has continued. CO₂ levels in August 2016 averaged 401.42 ppm.² The 400 ppm threshold was first recorded to have been exceeded at another of the WMO global super-stations, the Mauna Loa Observatory in Hawaii, in 2013. When that occurred, NASA climatologist Dr Gavin Schmidt observed that "[w]e are a society that has inadvertently chosen the double-black diamond run without having learned to ski first. It will be a bumpy ride".³ This year at Mauna Loa Observatory, mean weekly concentrations of CO₂ as of 23 October 2016 were 402.07 ppm and the May 2016 value of 407.7 ppm was the highest monthly value on record.⁴ These measurements at two of the WMO global super-stations make it almost certain that the global annual average CO₂ level will exceed 400 ppm for 2016. This is a 44 per cent increase from the concentration of 278 ppm around the year 1750 and likely the highest level in at least the past two million years.⁵

The large and rapid increase in the atmospheric concentration of CO₂ and other greenhouse gases since 1750 is having significant consequences for the planet.

2015 was the warmest year on record for the planet since reliable global surface air temperature records began in 1880. The last 15 years are among the 16 warmest years on

¹ CSIRO and the Bureau of Meteorology, *State of the Climate 2016*, 19.

² WMO, *WMO Provisional Statement on the Status of the Global Climate 2016*, 2.

³ NASA, 'NASA scientists react to 400 ppm carbon milestone' <<http://climate.nasa.gov/400ppmquotes/>>.

⁴ WMO, above n 2, 3.

⁵ CSIRO, above n 1.

record.⁶ But more is to come. 2016 is very likely to be the world's hottest year on record.⁷ Global temperatures for January to September 2016 have been 0.88°C above the average for the 1961-1990 reference period and approximately 1.2°C above temperatures of the pre-industrial period.⁸ More than 90% of the Northern Hemisphere land areas north of the tropics were at least 1°C above average. Parts of Arctic Russia were 6 – 7°C above average, while other Arctic and sub-Arctic regions in Russia, Alaska and northwest Canada were at least 3°C above average. In the Southern Hemisphere, many areas were 1°C or more above average, including northern South America, northern and eastern Australia and much of Southern Africa.⁹

The warming is significantly affecting the oceans. Globally-averaged ocean temperatures and heat content are increasing. This warming extends to at least 2000m below the surface.¹⁰ Temperatures were above average over most ocean areas and were 1°C or more above average in many parts of the tropical eastern and central Pacific, the eastern tropical Indian Ocean and the Indonesian archipelago, the Tasman Sea, the western subtropical North Atlantic and the far north Pacific.¹¹

The very warm ocean temperatures contributed to significant coral bleaching in some tropical waters. One of the most significantly affected areas was the Great Barrier Reef where record high temperatures occurred in March 2016. Coral mortality of up to 50% was reported in the northern parts of the Great Barrier Reef north of Lizard Island. Coral bleaching was also reported from Pacific Island countries such as Fiji and Kiribati with associated fish deaths also reported in Fiji.¹²

Globally, the average sea level has risen over 20 cm since the late nineteenth century, with about one third of this rise due to ocean warming and the rest from melting land ice and changes in the amount of water stored on the land.¹³ Global sea levels rose very strongly during the 2015 – 2016 El Nino event, rising about 15mm between November 2014 and February 2015, well above the post-1993 trend of 3 to 3.5 mm per year, with the early 2016 values reaching new record highs.¹⁴

In Australia, the consequences of the increase in the atmospheric concentration of CO₂ and other greenhouse gases include:

⁶ CSIRO, above n 1, 3.

⁷ WMO, above n 2, 1.

⁸ Ibid.

⁹ Ibid 1-2.

¹⁰ CSIRO, above n 1, 3 and 14.

¹¹ WMO, above n 2.

¹² Ibid.

¹³ CSIRO, above n 1, 3 and 15.

¹⁴ WMO, above n 2.

- the mean surface air temperature and surrounding sea surface temperature have increased by around 1°C since 1910;¹⁵
- the duration, frequency and intensity of extreme heat events have increased across large parts of Australia;¹⁶
- there has been an increase in extreme fire weather, and a longer fire season, across large parts of Australia since the 1970s;¹⁷ and
- rainfall patterns have changed significantly, including a reduction in May – July rainfall by around 19 per cent since 1970 in the southwest of Australia, a decline in the April – October growing season rainfall by around 11 per cent since the mid-1970s in the southeast of Australia, and an increase in rainfall has increased since the 1970s in northern Australia.¹⁸

Comparatively, however, Australia is less at risk from climate change than other countries in Asia and Africa. The Global Climate Risk Index 2017 measures the level of exposure and vulnerability to extreme events. The 10 countries most affected by extreme weather events include six in Asia, being Myanmar, the Philippines, Bangladesh, Pakistan, Vietnam and Thailand.¹⁹

Poor countries in general are more exposed to climate change-boosted extreme events. There is unfairness in the distribution of these events: the least developed countries have contributed only a small fraction of the greenhouse gases warming the planet, yet they suffer more from extreme weather that has been made more intense and frequent due to greenhouse gases emitted by developed countries.

Climate change as a wicked problem

Climate change has been described as a ‘wicked problem’,²⁰ indeed as a ‘super wicked problem’.²¹ Wicked problems involve a combination of high levels of complexity, uncertainty and value divergence.²² Climate change exhibits these features. It involves polycentricity – a series of linked problems, none of which can be resolved in isolation. There are

¹⁵ CSIRO, above n 1, 2 and 4-5.

¹⁶ Ibid 2 and 7.

¹⁷ Ibid 2 and 8.

¹⁸ Ibid 2 and 9-10.

¹⁹ Sonke Kreft, David Ecksetin and Inga Melchior, *Global Climate Risk Index 2017*, 6.

²⁰ See Brian W Head, ‘Wicked Problems in Public Policy’ (2008) 3 *Public Policy* 101, 103.

²¹ See Elizabeth Fisher and Eloise Scotford, ‘Climate Change Adjudication: The Need to Foster Legal Capacity: An Editorial Comment’ (2016) 28 *Journal of Environmental Law* 1; Chris Hilson, ‘It’s All About Climate Change, Stupid! Exploring the Relationship Between Environmental Law and Climate Law’ (2013) 25 *Journal of Environmental Law* 359; Kelly Levin et al, ‘Overcoming the Tragedy of Super Wicked Problems: Constraining our Future Selves to Ameliorate Global Climate Change’ (2012) 45 *Policy Sci* 123; Richard J Lazarus, ‘Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future’ (2009) 94 *Cornell Law Review* 1153.

²² Head, above n 20, 103-104.

interdependencies in the environmental systems, and between the causes and consequences of climate change. There are uncertainties in the knowledge base, including the extent of climate change and the causes and the consequences of climate change. There is uncertainty in relation to the risks and consequences of action and inaction. There is divergence in views as to the need for and the extent of change in law, governance and behaviour to address climate change and its consequences and the allocation of responsibility for any such change. There is divergence in views about values and equity issues, including the equitable sharing of burdens and benefits. There is divergence in views as to the choice of solutions to climate change. These and other issues of complexity, uncertainty and divergence combine to make climate change a wicked problem.

Solving wicked problems is inherently difficult. Three commonly recommended approaches are better knowledge, better consultation and better use of third-party partners.²³ There is a need to improve significantly the knowledge of both the wicked problem of climate change, its causes and consequences, and possible solutions. Better consultation and collaboration with stakeholders is necessary to develop effective, efficient and equitable solutions to climate change and its consequences. Such collaboration may involve reliance on non-governmental stakeholders, including the private sector and community organisations. The challenge posed by climate change is 'to develop new thinking about the multiple causes of problems, opening up new insights about the multiple pathways and levels required for better solutions, and gaining broad stakeholder acceptance of shared strategies and processes'.²⁴

This special issue of the *UNSW Law Journal* on rethinking climate change and the law addresses this challenge. The articles examine, from diverse perspectives, the problem of climate change and the adequacy of the law in solving it. The diversity of perspectives represented in the articles is illustrative of the complexity and multifaceted nature of the problem and of the solutions to it. An overview of the diversity of coverage can be provided by grouping the discussion in two categories: the problem and the solution.

Understanding the nature of the problem of climate change

Climate change is a problem that crosses boundaries of knowledge disciplines. It is a scientific, economic, social, environmental and legal problem, to name but a few of the knowledge disciplines. It is also a normative problem, involving conflicts in values and what is equitable. Understanding this transdisciplinary and interdisciplinary nature of the problem is important if effective, efficient and equitable solutions are to be found. Too narrow a conception of the problem confines the solutions. For instance, characterising climate change as simply a scientific problem leads to devising scientific solutions alone. These scientific

²³ Head, above n 20, 114.

²⁴ Ibid 115.

solutions will neither be effective nor efficient in addressing the multiple causes of the problem nor will they be accepted by all stakeholders as equitable.

Climate change is a problem of the past – the climate change-induced events suffered today are a product of past behaviour – but it is also a problem of the future. Climate change does not readily fall within a pre-existing category of harm recognised by law.²⁵ The future harm will be dispersed across the globe, affecting all people but some people with particular severity. Although there is reasonable certainty that there will be future harm, the precise nature, extent and incidence of the future harm is uncertain. There is an urgent need to examine how well the law (in all its areas) is equipped to respond to this certain future harm but uncertain incidence and extent of harm.

Climate change poses other challenges for the law. It is a product of multiple actors, some making large contributions (the major emitters) but most making small contributions to climate change. How is responsibility for past and future harm to be allocated?

Climate change is also a product of slow onset processes, rather than discrete actions or events causing acute symptoms. Climate change is the sum of innumerable small actions, each seemingly insignificant but collectively and cumulatively significantly contributing to climate change. These and other diverse facets of the climate change problem need to be better understood.

Finding the solutions to climate change

Albert Einstein is often attributed (but may have been misattributed) with saying that ‘the definition of insanity is doing the same thing over and over again, but expecting different results’. Nation states’ past responses (or in some cases, lack of response) to climate change involve an element of insanity: the same things have been and continue to be done, expecting different results. Instead, there is an urgent need to do different things. For the law, this involves thinking creatively and laterally, across the different areas of law and different jurisdictions. Law is a form of social ordering and creates forms of organisation. There is a need to better understand these forms of ordering and organisation, question assumptions as to the law and its role and application, and devise creative and innovative solutions and reforms.

One type of reform is to evolve from top down to bottom up solutions. This reform is being evidenced in three ways. First, in international action to address climate change, the *Paris*

²⁵ Liz Fisher, Eloise Scotford and Emily Barritt, ‘Why Understanding the Legally Disruptive Nature of Climate Change Matters’ on *OUPblog* (22 April 2015) <<http://blog.oup.com/2015/04/legally-disruptive-nature-of-climatechange/>>.

Agreement under the *United Nations Framework Convention on Climate Change*²⁶ has moved from top down, imposed targets to mitigate greenhouse gas emissions to bottom up, nationally-determined contributions. Wewerinke-Singh and Doebbler and McAdam discuss the bottom up approach of the *Paris Agreement*.

Second, there is increasing recognition of the need for bottom up action by communities to complement top down action by government. This is facilitated by giving respect and recognition to individuals, groups and communities, thereby promoting environmental justice. Lack of recognition inflicts damage, constrains individuals, groups and communities and leads to ineffective participation in the polity (procedural injustice) and to inequalities in distribution of environmental benefits and burdens (distributive injustice).²⁷

Giving respect and recognition to individuals, groups and communities encourages a plurality of viewpoints and values, which is necessary for developing solutions to the wicked problem of climate change. Participation in the polity should not be screened so as to allow only those people or those viewpoints and values which are predetermined to be acceptable or which fit within preconceived frameworks of law and governance. The benefits of broadening and making more meaningful and effective public participation is advocated by a number of the contributors to this issue, including Manifold and Jessup; McDonald, McCormack and Foerster; and Morgan and Kuch. McAdam explains how the Nansen Initiative on Disaster-Induced Cross-Border Displacement, by listening to a wide range of views and not imposing a preconceived framework, conceptualised a comprehensive approach to displacement in the context of climate change and disasters.

The manner and extent of participation of individuals, groups and communities in environmental decision-making should be meaningful. The level of participation is linked to the level of potential influence on the decision or action being considered.²⁸

The community can also participate in institutions and institution building to promote the mitigation of and adaptation to climate change. The institutions can be public regulatory institutions, but increasingly are private enterprises. Community engagement with these private enterprises may be by shareholder actions, such as by bringing shareholder resolutions for climate change transparency to ensure that corporations adequately report on their contribution to climate change and the risks that climate change poses to corporate assets (such as the stranding of fossil fuel reserves), for divestment of activities and assets that contribute unacceptably to climate change (such as coal mining) or for greater corporate

²⁶ Opened for signature 4 June 1992, 1771 UNTS 107 (entered into force 21 March 1994).

²⁷ David Schlosberg, *Defining Environmental Justice: Theories, Movements and Nature* (Oxford University Press, 2007) 14; Justice Brian J Preston, 'The Effectiveness of the Law in Providing Access to Justice: An Introduction' in Paul Martin et al (eds), *The Search for Environmental Justice* (Edward Elgar, 2015) 23, 38.

²⁸ See generally Justice Brian J Preston, 'The Adequacy of the Law in Satisfying Society's Expectations of Major Projects' (2015) 32 *Environmental and Planning Law Journal* 182.

social responsibility generally. The community may also seek to influence corporate behaviour by divestment campaigns, urging investors to divest from corporations that contribute unacceptably to climate change, such as fossil fuel industries. Richardson assesses the legality of fossil fuel divesting by trust funds and public financial institutions and how fossil fuel divesting might be legally advanced.

The community may also build its own enterprises, such as the example given by Morgan and Kuch of a community energy enterprise to supply renewable energy to the community.

The community may engage in adaptive co-management of projects between government, project proponents and communities, 'each party being recognised for their knowledge and capacity to build ... climate ... resilience', as Manifold and Jessup argue.

The community can provide public oversight of projects, including monitoring performance and enforcing compliance, a point made by McDonald, McCormack and Foerster. The community thereby promotes good governance.

Third, there are calls for bottom up regulation *by* the environment rather than top down regulation *of* the environment. The needs of the environment should drive the law and governance systems for tackling climate change. This ecocentric approach manifests itself in various ways. It involves full implementation of the integration principle, one of the principles of ecologically sustainable development. The principle ensures the effective integration of environmental (including climate change) considerations into social and economic development decisions. Morgan and Kuch advocate the need 'to weave social and ecological values into the heart of exchange, and thus to address environmental law goals "from the inside out"'. There needs to be 'environmental remediation' of law and governance systems.

An ecocentric approach assists in overcoming 'the transcendence of place'. The preference of lawmakers for generalisation, abstraction and universalisation of law detaches law from place. Environmental law is about the environment and its components as general concepts but not about any specific place, thing or person in the environment. Morgan and Kuch argue that there is a need to invest in 'place-sensitive, localised conceptions of legal strategies' and 'for re-imagining legal interventions and regulatory frameworks along lines crafted by the contours of local place and the vernacular dialects of social space'.

An ecocentric approach would recognise that ecological systems evolve and adapt, and trigger the need for developing adaptive law and governance systems. Responding to climate change demands flexibility and adaptability. Systems that are able to adapt are resilient. McDonald, McCormack and Foerster call for reform of conservation laws to promote resilience to climate change. Bell-James focuses on the carbon storage capacity of coastal ecosystems and suggests ways in which 'blue carbon' can be integrated into the existing legal and policy frameworks. Kallies identifies the lack of flexibility and adaptability in the

market and legal frameworks for the stationary electricity sector as a barrier to dealing with climate change. Not only is the current market framework perpetuating carbon-intensive patterns of electricity generation but 'its legal frameworks are designed and embedded in a way that makes change cumbersome and difficult to achieve'.

There is a need to reform not just the patent architecture of laws regulating climate change and its consequences but also the underpinning foundations of the laws and the legal system. For example, principles of the rule of law, legality and separation of powers are constitutional bedrocks of the legal system and any action in relation to climate change will be judged against them.²⁹ There are also the underpinning values that form the normative framework of the legal and governance systems. As I have noted earlier, Morgan and Kuch argue that there is a need to weave social and ecological values into the heart of the system, not bolt them on as an afterthought, such as is being done with carbon offsets.

Finally, reform is usefully directed towards the governance systems. Good governance includes having good laws as well as good implementation and enforcement of these laws. My earlier comments are relevant to these aspects of good governance. But there is also the need to conceive of new forms of governance, including polycentric governance models (suggested by McDonald, McCormack and Foerster), commons-based conceptions of governance (suggested by Morgan and Kuch) or cooperative public-private arrangements that break down deeply-ingrained ideas of the separation of the market as the private domain and climate policy as the public domain (noted by Kallies).

Continuing the climate change conversation

This special issue of the *UNSW Law Journal* provides insights and critical analysis of the complexity, uncertainty and value divergence of the problem of climate change and diverse viewpoints on solutions, particularly relating to legal and governance systems.

The articles make a valuable contribution to the ongoing conversation about climate change.

²⁹ Liz Fisher, Eloise Scotford and Emily Barritt, above n 25.