



## Land use planning, climate change, and changing natural hazards

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Climate change impacts on the frequency and severity of natural hazards, in particular heatwaves, flooding, severe storms, sea level rise, storm surges and importantly bushfires.

With climate change, fire seasons start earlier and end later, the number of days with dangerous fire weather per season increases and reducing the time and opportunities for fuel reduction. Some areas may be experiencing increases in extreme fire days (of up to 45% (Canberra) or more compared to 1990-2009, an estimate derived from (NSW Department of Planning, Infrastructure and Environment, 2020). (Macarthur Forest Fire Danger Index with scores over 50).

The social, economic and environmental impacts of bushfires are immense, as is becoming clear now some of the early impacts of the 2019-20 bushfires in Victoria, NSW and South Australia are being assessed. Early SGS estimates indicate that the cost may be as high as \$3.5 billion. The cost to the natural world in terms of flora and fauna lost is immeasurable.

Another aspect of climate change is the geography of natural hazards changes. Places that may not be at risk today, could be at risk by 2050. Some places historically not known for bushfires, are now experiencing them. The February 2019 fires in Tasmania affected iconic alpine species such as the Pencil Pine, cushion plants and temperate rainforests, areas that are not supposed to burn.

### The challenge of land use planning in the light of climate change

Planning for natural hazards in a changing climate requires land use planning and building systems to deal with new challenges such as:

- How do we ensure that dwellings and neighbourhoods developed today are within acceptable levels of risk in say 30 or 50 years? For example, with respect to flooding hazard:
  - o a 1 in 100-year average recurrence interval (ARI) flood event today may occur at a much lower interval in 2040
  - o Areas that are not at risk of tidal inundation today may be at risk 50 years from now as a result of sea level rise.
- What planning horizons for the built environment do we need to take into account in decision making?
- What is the economic life of a house, and what is the economic life of a neighbourhood?
- Is the only response in land use planning to develop an area or quarantine it? Or is there a wider range of possible adaptation responses? Adaptation responses for communities at risk can involve a range of location specific options: retreat, accommodate, and protect. If so, how do we manage this, and what additional governance arrangements (including establishing who benefits and who pays for protection measures), and policy areas need to be involved?
- Instead of statutory responses alone, what information and policy is needed to support a more strategic response via the land use planning system?

The land use planning (and building) system is inherently static and does not cope well with dynamic natural hazards. Traditionally, the land use planning and building systems have relied on the assessment of hazards (their geographical

coverage and/or return intervals) by relevant natural resource management agencies when determining acceptable locations, patterns and forms of development. These agencies assess hazards using statistically derived event return levels based on historic data. With climate change impacting on natural hazards, statistical patterns of event recurrence and intensity are becoming more dynamic. As a result, historical data is a less reliable basis for predicting future risk patterns. To better respond to these challenges, the land use planning and building systems (including inputs and tools) need to consider natural hazards as dynamic processes.

### Issues when planning for changing natural hazards

One of the current issues in the planning system is that local planning authorities are often not required to take climate change into account. In NSW, for example, it is currently left to the discretion of local government authorities to consider climate change as a factor to consider in their planning system, or not. There are no State-authorised scenarios for climate change. Some Councils with significant riverine flood risks that have chosen not to consider climate change in their planning system and are allowing subdivisions in floodplains. These areas may be at risk from more frequent and severe flood events in the future due to climate change.

In bushfire prone areas, the planning overlays are based on historic events, not projections. For example, the updated Victorian Bushfire Management Overlay (BMO) and the Murrindindi Shire's Hume Region Regional Bushfire Planning Assessment (RBPA) are both based on present day risks. In the building system, requirements are also based on historic events without consideration of climate change. For example, Building Amendment (Specific Use Bushfire Protected Buildings and Other Matters) Regulations 2016 refer to present day hazards in present day hazards areas

Often there are no State standards in relation to what consists of an acceptable level of risk over the lifetime of an asset. As a rule of thumb, dwellings are required to be able to withstand a flood that occurs on average once every 100 years. What then is the acceptable level of risk for a retirement village, a commercial shopping area or a hospital? What is the accepted functional lifetime of individual assets, and what of integrated communities? In recent years, some progress has been made in incorporating climate change factors in the planning of the built environment. For example, in 2016 in Victoria, a requirement to plan for possible sea level rise of 0.2m over current 1 in 100-year levels by 2040 (new urban infill development), and 0.8m by 2100 for all other areas was added to the State Planning Policy Framework (Clause 13.01-1, Coastal Inundation). In Tasmania, planning schemes need to incorporate coastal erosion and storm hazard bands. These bands identify which areas are at present day risk of coastal hazards, by 2050 and by 2100.

A key limitation for adaptation planning is the lack of spatial understanding of the vulnerability of communities and infrastructure to climate impacts (Measham et al, 2011). The cost for climate hazard mapping can be prohibitive for smaller councils and can be disputed when there is a lack of



wider regional, State or even national consistency in relation to climate change scenarios, acceptable levels or risk and agreed data sources.

The land use planning system provides arguably the "most crucial tools available to local government in driving adaptation to climate change" (Measham et al, 2011). Land use planning can be used to ensure hazard free land is available for development, and to use the post-disaster window of opportunity to encourage individual developments to retrofit or relocate (Burby et al, 2000). Failing to use the land use system effectively can result in perverse outcomes.

As an example, despite the Victorian Royal Commission into the 2009 fires recommending against rebuilding in some of the most fire-prone areas, more residents now live there. "Kingslake's population fell after the fires, as people left. But new housing estates in the tree-covered mountains are drawing newcomers. Half the town's population are newcomers, real estate agents estimate. There are now almost as many people as the town's 2008 peak – and about 20 per cent more houses." (Sydney Morning Herald, 2019)

Adaptation includes managed retreat, or avoidance (Ensure that new developments of private and public infrastructure and assets are not permitted in areas likely to be affected by climate change, without substantial planning controls being implemented, NCCARF, 2017). And protection, or accommodation. (Consolidate urban development by favouring infill and redevelopment of existing urban areas to minimise urban sprawl into highly vulnerable coastal areas, NCCARF, 2017). Zones and overlays are generally not configured to managing land use and development on a temporal basis. With dynamic natural hazards, the planning system needs tools to enable the roll-out of spatial adaptation strategies, including managed retreat.

### Best practice principles

Bushfire and other changing natural hazards require the land use planning system to meet the following best practice principles:

1. A clear mandate in legislation for the land use planning and building system to tackle dynamic climate change hazards. This may require State planning acts and State LGA acts to be amended to reflect that management of the impacts of climate change and changing natural hazards are a function of the planning system and of local government.
2. State-wide policies, agreed data, and guidance to drive the formulation of settlement and development strategies and regulations. This includes hazard mapping: comprehensive, Government-authorised and freely available spatial data and projections on climate change hazards, prepared at a sufficient level of granularity to support local area land use planning and development control. While increasingly more small area projections of climate change impacts are being made available they may not always be of sufficient granularity or up-to-date. (Such as the NARCIIM data



available via Adapt NSW, providing small area projections for NSW and ACT for a number of climate variables and climate impacts including bushfires). It also includes policies and standards on acceptable levels of risk over the (functional or economic) lifetime of the built environment, individual assets and communities.

3. Nested, statutorily binding, plans and regulations which translate State-wide policy statements down to the regional and local level. A subsidiarity-based approach to strategic land use planning which allows regional level issues to be dealt with in a binding way in planning schemes, while allowing local communities – through their local Councils – to devise preferred customised responses to managing risk exposure, where local discretion is possible and desirable. While this exists for land use planning overall, climate change adaptation has not been systematically been integrated.
4. Appropriate statutory mechanisms. Effective development control provisions that enable regions and local councils to manage natural hazard management and climate change adaptation strategies. This could include the introduction of a climate change adaptation management overlay to replace or add to existing hazard overlays. Or the introduction of zonings which reflect the strategic adaptation response, including retreat or protection zones.

The planning profession should support and inform State and Territory government on the specific gaps and opportunities for improvement in each jurisdiction. It is an acute call for action as it becomes increasingly evident that the pace of climate change is faster than previously expected. Renowned climate scientist Dr Joelle Gergis is a key contributor to the United Nations Intergovernmental Panel on Climate Change's (IPCC) sixth assessment report, currently underway and expected by 2022. (Gergis, Noelle (2019), The terrible truth of climate change. The latest science is alarming, even for climate scientists. The Monthly (August 2019) [www.themonthly.com.au/issue/2019/august/1566136800/jo-elle-gergis/terrible-truth-climate-change](http://www.themonthly.com.au/issue/2019/august/1566136800/jo-elle-gergis/terrible-truth-climate-change)). She describes how the modelling currently under way paints a grim picture. The models are coming up with global temperature changes of around 5°C by 2060 if we do not drastically reduce emissions. The global temperature has risen 0.8°C so far since pre-industrial times. This means that the pace of change will accelerate from about 0.8°C in 140 years to 1°C each decade on average from now an acceleration of 17 times. The use of averages distorts the fact that the acceleration is not even over the coming decades.

Importantly, any attempts to adapt to climate change should avoid maladaptation ie proposed measures should not exacerbate climate change, defined in Victoria's Climate Change Adaptation Plan 2017-2020 as "adaptation action that adversely affects other systems, sectors or social groups, increases their vulnerability or increases greenhouse gas emissions". ●

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