

Disaster Risk Reduction in Australia

Status Report 2020



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Preparedness Center

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UN Office for Disaster Risk Reduction

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About this report

The disaster risk reduction (DRR) status report provides a snapshot of the state of DRR in Australia under the four priorities of the Sendai Framework for Disaster Risk Reduction 2015-2030. It also highlights progress and challenges associated with ensuring coherence among the key global frameworks at the national level; and makes recommendations for strengthening overall disaster risk management (DRM) governance by government institutions and stakeholders at national and local levels.

As this report is based on information available as of the end of the year 2019, an update on the COVID-19 impact, response and recovery using a risk-informed approach by countries is provided at the beginning of this report. This report has been prepared by the Asian Disaster Preparedness Center (ADPC) on behalf of the United Nations Office for Disaster Risk Reduction (UNDRR) through country consultations and a desk review of key documents, including legal instruments and DRR policies, plans, strategies and frameworks, etc.

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Australia's Response to COVID-19 and Disaster Risk Reduction

The first COVID-19 case in Australia was confirmed on January 25, 2020. Social distancing measures were increasingly tightened in early response phase including by banning public gatherings of more than two people and shutting down non-essential businesses. The National Cabinet agreed to a three steps plan to ease restriction in May 2020 and a national framework for re-opening by December 2020. States and Territories implemented strict lockdown procedures including in metropolitan Melbourne as well as the State of Victoria where COVID-19 resurgence took place. On November 19, South Australia implemented an immediate, strict lockdown for six days as circuit breaker following the spread of a community cluster but the lockdown ended three days earlier after discovering misleading information.

Real GDP rebounded 3.3 percent quarter over quarter in the third quarter of 2020 after a contraction of 7 percent in the second quarter. At the Commonwealth level, fiscal stimulus consisting of expenditure and revenue measures worth A\$267 billion (13.75 percent of GDP) has been put in place through FY2023-24. The majority of the stimulus will be executed through FY2020-21. Separately, the Commonwealth government has committed to spend an additional amount of A\$16.6 billion (0.8percent of GDP) to secure access to COVID-19 vaccines, roll out a national Vaccination Program, strengthen the health system, and protect vulnerable people, including those in aged care, from the outbreak of COVID-19. The Commonwealth government has also agreed with the States and the Territories to share the public health costs incurred by the States and Territories in treating the COVID-19.

The Australian Government response to the COVID-19 outbreak has been exemplary from comprehensive response to long term recovery and prevention measures. The Australian Health Sector Emergency Response Plan for Novel Coronavirus was launched in March 2020 by the Department of Health with a national strategic framework and an operational plan. In Australia, state and territory governments have primary responsibility for health matters. When a major health issue faces our country, state and territory governments work together with the Australian Government. They share information to provide the best possible care, move resources to where they are needed, and ensure the approach is consistent and integrated across our country. The key committee used to coordinate this and make key decisions is the Australian Health Protection Principal Committee (AHPPC).

Though the COVID-19 Plan is focused on government activities, many agencies (government and private) are working to support the health response and to ensure Australians strengthen its disaster reduction strategies. In addition, the national, state and territories government adopted several other necessary plans and strategies such as the Coronavirus (COVID-19) National Health Plan; Management Plan for Aboriginal and Torres Strait Islander Population; Management and Operational Plan for People with Disability; Pandemic Health Intelligence Plan; Australian National Disease Surveillance Plan for COVID-19 and Guide to the Establishment of an Aged Care Health Emergency Response Operations Centre. Among all, the government put a lot of emphasis on mental health and other public health emergency issues.

The 2019–20 Australian bushfire season that started in September 2019 and cointai8end till March 2020 was very significant due to the record number of deaths, longevity or size. As per the Commonwealth Scientific and Industrial Research Organisation (CSIRO) more than 10

million hectares of land burned. This was already greater than the area burned in the Black Saturday 2009 and Ash Wednesday 1983 bushfires combined. The Geoscience Australia states that lightning is the main natural cause of bushfires, accounting for about half of all cases. The Bureau of Meteorology noted in its Annual Climate Statement 2019, published on 9 January 2020, that the extensive and long-lived fires appear to be the largest in scale in the modern record in New South Wales, while the total area burnt appears to be the largest in a single recorded fire season for eastern Australia.

Australia has a robust system to prevent, prepare for and respond to health emergencies include disease outbreaks, natural disasters and mass casualty incidents. The National Disaster Risk Reduction Framework identifies four national priorities related to the Sendai Framework for Disaster Risk Reduction that guide action to reduce disaster risk. Each priority has five-year outcomes that are supported by strategies for action: 2019–2023.

1. Introduction

The Commonwealth of Australia (hereafter referred as Australia) is a country within Oceania, comprising the Australian continent, island of Tasmania and thousands of other islands. It is the sixth largest country, covering an area of 7,692,024 km², which also makes it the largest island, and the smallest single continental land mass in the world (Geoscience Australia, 2019). Australia is characterized by mainly flat topography (Mount Kosciuszko as the highest point, reaching 2,228 meters above sea-level) and arid to semi-arid climate. Approximately 20 percent of the area is classified as desert, and most of the annual rainfall occurs around the extensive arid core of the country, which can reach the intensity of tropic precipitation in some of the coastal areas (Government of Australia, 2019). Thus, climatic zones range from tropical forests to deserts and temperate forests. Administratively, the country is divided into six federal states and ten territories (three internal and seven external), structure of which depends on federal legislation. Most states divide their land into counties, parishes or 'hundreds', among other terms, and they are usually based on cadastral divisions for the purposes of identifying land in terms ownership. However, counties have no administrative function, but their governance is dependent on local government areas as per the states' decree. Also, it should be noted that states and territories have a high degree of autonomy; they operate disaster and emergency management in consideration of the federal guidance, but with their respective agendas, available funding and capacities to a varying degree.

In terms of economy, the country has now entered into its 28th year of consecutive growth, which is a new record among developed economies for uninterrupted expansion (Australian Trade and Investment Commission, 2019). The nominal estimated GDP of US\$ 1.5 million accounts for 1.7 percent of the global economy, driven by a vast services sector which constitutes to approximately 70 percent of the national GDP and employed nearly 80 percent of all the working age populations in 2017 (Parliament of Australia, 2018).

However, challenges remain. Australia is frequently affected by droughts, storms, flooding, wildfires and extreme temperatures, latter of which constitutes to highest mortality, while storms have caused most of economic damages and losses (CRED, 2019). Also, the annual disaster-related costs are projected to increase to US\$ 39 billion by 2050, and climate change is expected to exacerbate hazards such as flooding and wildfires, increase heat-related deaths, and impose immense stress not only to the emergency services, but also to the economy and population (Glasser, 2019). Thus, significant efforts and investment are required to mitigate the future risks of disasters in Australia. This report intends to explore some of these dimensions vis-à-vis international mandates on disaster risk reduction (DRR), climate change adaptation (CCA), as well as current capacities, vulnerabilities, exposure and institutional frameworks.

1.1 Demographic Characteristics

The estimated population of Australia in March 2019 was 25,287,400 people, an increase of 388,800 since the previous year, growing at a rate of 1,6 percent per annum (Australian Bureau of Statistics, 2019). The highest growth is concentrated to capital cities of Sydney, Greater Melbourne, Greater Brisbane, Perth and Darwin, and nearly 90 percent of the population were living in urban areas by 2016, hence making Australia among the most urbanised in the world (Australian Bureau of Statistics, 2019). It is also a diverse country, hosting numerous ethnicities and religions. In 2016, 60 percent of the people reported to

hold a belief (mostly Christian denominations) but also Islam, Buddhism and Hinduism. Also, 2.8 percent (649,171) were identified as Aboriginal or of Torres Strait Islander origin (Australian Bureau of Statistics, 2017).

Australia is placed in very high human development category (3rd among 189 countries and territories measured) with a value of 0.939 (UNDP, 2018). Furthermore, the government has taken a comprehensive approach to advancing the rights of women and girls, to enhance gender equality and to guarantee equity in the distribution of services among its citizens. While the country has no Bill of Rights, protection of human rights is founded into the Constitution and other legislation passed by the Commonwealth Parliament, State or Territory Parliaments, which guarantee the materialisation of rights of non-discrimination, freedom of religion and speak among others, exercised and monitored by the Australian Human Rights Commission (Australian Human Rights Commission, 2019).

These factors, and investments in health and education combined to continued population growth, have supported the astonishing economic boom due to sustained demographic dividend where the dependency rate was lower than the numbers of working age population. However, the trend has begun to change. The share of people aged 15-64 is now in decline, indicating a demographic transition towards an aging workforce which is most likely to affect productivity and employment in an adverse manner unless growth of productivity is reinvigorated through risk management and innovation (Lowe, 2014).

1.2 Economic Impacts of Disasters

Disasters have the potential to severely hinder economies and offset their future growth projections globally. In Australia, comprehensive work has been done to not only identify the extent of physical damage and losses, but also to estimate the indirect and intangible costs which result from disruptions to business and connectedness, as well as the impacts on health and wellbeing which are often overlooked in the research addressing the nexus of disasters and economy. It was identified that the monetary value of such intangible costs in 2015 exceeded US\$ 6 billion, which corresponds to 0.6 percent of the GDP (Deloitte, 2016), demonstrating that the social costs of disasters to the economy in the aftermaths of a catastrophic event may sometimes be higher than their physical impacts (figure 1).

Research has also been conducted on identifying trends in disaster-related damages and losses¹, which reveals that they have reached nearly US\$ 119 billion between 1967 and 2013 where data was available (Handmer, et al., 2018). Large events are disproportionately represented; they contribute to 81 percent of all losses which highlights the significance of major disasters such as storms (contributing to 32 percent of all losses) and flooding (28 percent) (Handmer, et al., 2018). Combined loss caused by storms, flooding, cyclones and bushfires constitute to 96 percent of all the total losses due to disasters, and they are also the most common events (Figure 2).

¹ An update to the Bureau of Transport Economics (BTE) report 'Economic Costs of Natural Disasters in Australia 2001, which has been the only national-level assessment conducted about the economic impacts of disasters in Australia until 2018.

Figure 1 Total economic cost of Queensland floods, Black Saturday bushfires and Newcastle earthquake (Deloitte, 2016).

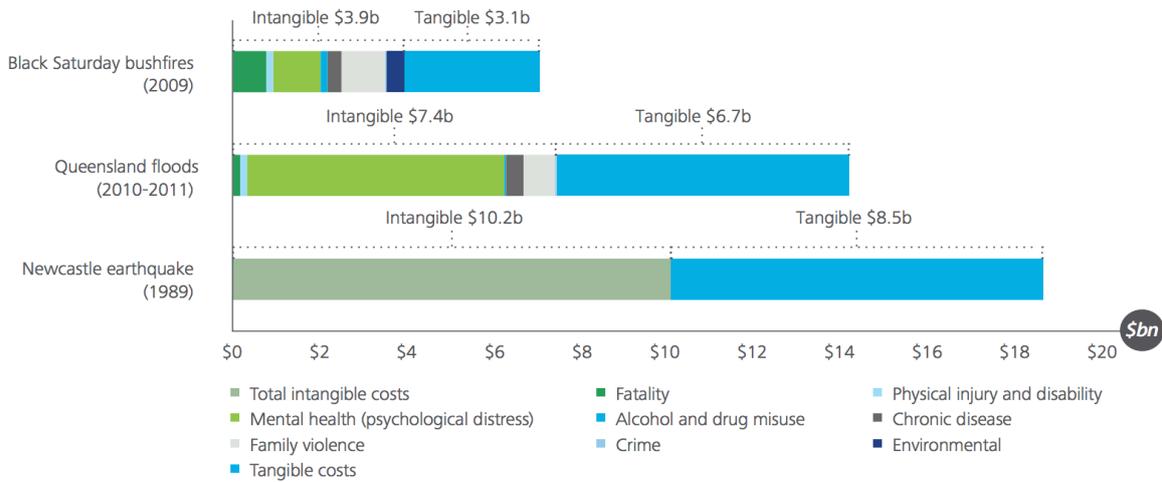


Figure 2. Losses by type of disaster and state and territory 1967–2013 (Handmer, et al., 2018)



Furthermore, disaster impacts have a high spatial variability. For example, Queensland has a disproportionately high risk of tropical cyclones, storms and flooding, whereas Victoria and Greater Melbourne are exposed to bushfires to a greater degree. In Sydney, 1.4 million people are living within areas with a high to very-high flood risk (SGS Economics & Planning, 2018).

Approximately 20 percent of the national GDP is produced within areas which are highly exposed to tropical cyclones, and an estimated 11 percent is generated in regions with a high risk of bushfires to occur (Barnes, et al., 2019). This has severe implications to future costs of disasters given the exacerbating effects of climate change to hydrometeorological

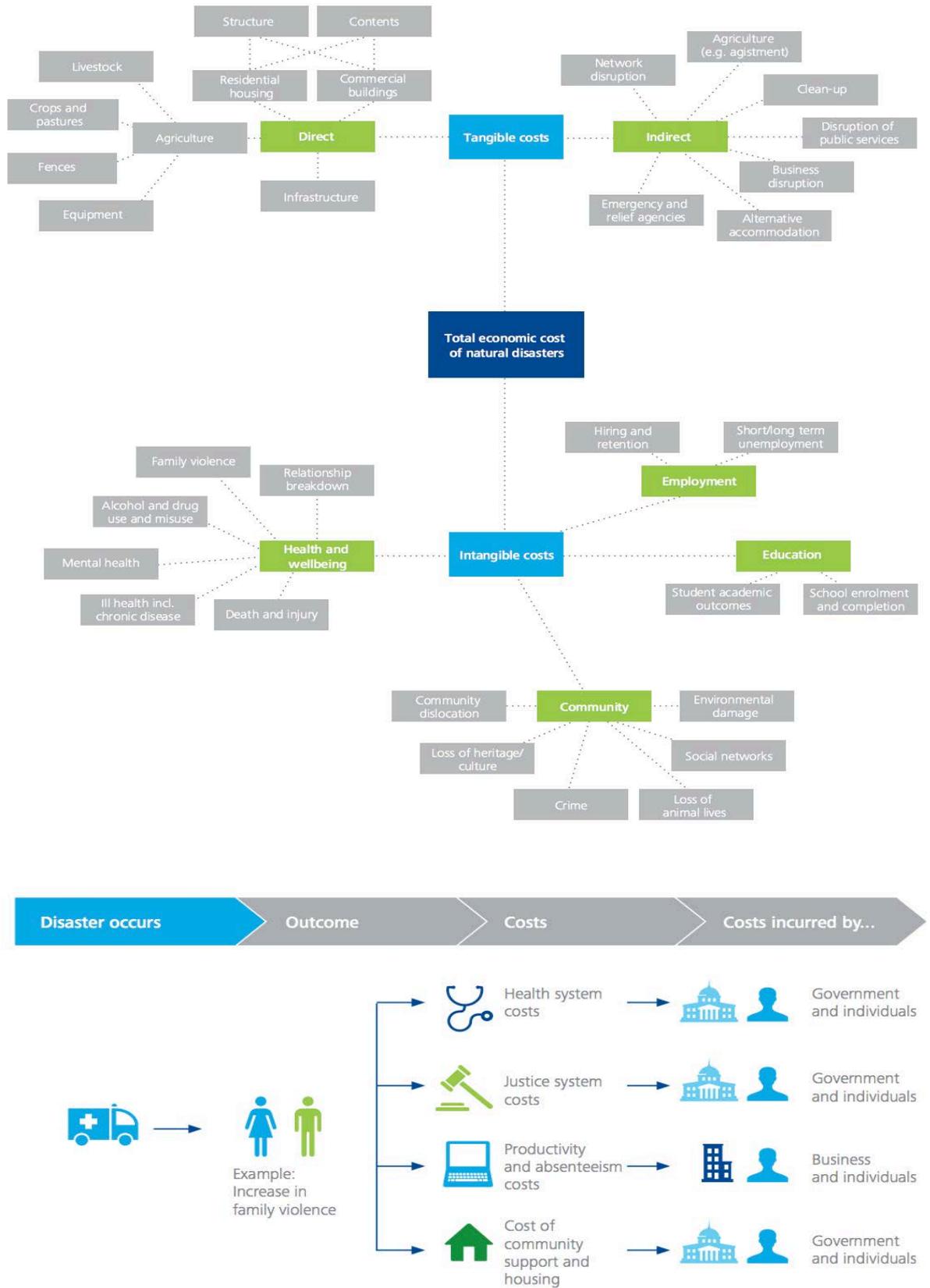
hazards, and highlights the need to move from response and recovery-orientated disaster financing towards disaster mitigation at the government's level. Historically, only 3 percent of what is spent to recovery and response has been allocated to mitigation in Australia, and the private sector institutions and insurers have stepped into this vacuum within risk financing (Barnes, et al., 2019). The future costs of disasters are expected to increase by 3.4 percent annually, exceeding US\$ 26.9 million by 2050 (The Australian Business Roundtable, 2017), which requires extensive research to embed considerations for resilience into policy and decision-making to adequately mitigate the risks to the economy.

1.3 Social Impacts of Disasters

Disasters or extreme weather events have affected more than 9 million Australians during the past three decades (The Australian Business Roundtable, 2017). Health, wellbeing, education, engagement, employment and livelihoods can be severely disrupted, and sometimes these effects may persist for a person's lifetime. Thus, these dimensions must be explored alongside, and within, the context of economic impacts as well (figure 3). In the past, not much research has been dedicated to exploring this nexus. However, Deloitte Access Economics examining the Newcastle earthquake (1989), Black Saturday bushfires (2009) and Queensland flooding of 2011-2012 identified that the cost of social impacts including increases in family violence, stress-related mental health issues, crime and alcohol misuse far outweighed the costs of rebuilding infrastructure (Deloitte, 2016).

Yet, it is important to recognise the social burden of disasters outside the economic context as well, given the fact that human life and wellbeing have value beyond the monetary cost that prevailing malaise may cause. Psychosocial suffering, discontinued education, poverty, threat of violence, injuries or the risk of death will burden individuals and families to an increasing extent, which creates a challenge for governance; needs for social support and healthcare are increasing alongside the increased frequency of disaster impacts while the other end of disaster financing is struggling with the recovery costs and needs for structural mitigation. It is crucial to bridge this gap to address the needs of those disadvantaged, who often experience the most severe social impacts, inhabit disaster hotspots and are not necessarily integrated to the economy (or are not in reach of social protection). Only way to mitigate the impacts to those poorest and marginalized would be to address the root causes of inequality, poverty and injustice which results in their heightened risks (Dominey-Howes, et al., 2016). Thus, integrating the social costs into the wider economic perspective is only half what is required if the same economic system does not facilitate equity for disaster and climate risk reduction within a given society, and only works to reinforce characteristics of said system that breeds inequality.

Figure 3. Impacts of disasters in Australia, and an example of cost occurrence (Deloitte, 2016).



Indeed, there are different scales on which disasters affect lives and people which cannot be explored through estimating the costs of their suffering. For example, the impacts of severe weather to those sleeping rough, living in their cars or in shelters can lead to an increase in injuries, anxiety and feelings of isolation while the existing services for homeless remain under-resourced and struggle to provide support especially in times of disasters (Every, 2016). These individuals may be “invisible” to the emergency services and the economy – which still does not downplay the need to consider the impacts of disasters to homeless within emergency planning and risk management. Other factors, including gender, income, mobility, age, disability, location and English language skills contribute to varying scales of vulnerability in Australia as well (Duncan, et al., 2018). For example, individuals belonging to the LGBTIQ+ groups may be reluctant to approach aid-institutions or faith-based organisations in Australia due to fear of disclosing their gender identity or sexual orientation which limits them from seeking out emergency services they need in the fear of facing discrimination (Leonard, et al., 2018). These social dimensions of disaster impacts must be increasingly highlighted to identify the extent of interventions required for truly equitable emergency management in the future.

2. Disaster Risk Profile

2.1 Hazards and Climate Change

Australia is exposed to a range of natural hazards from earthquakes, cyclones, landslides and flooding to storms (and storm surges), heavy wind, bushfires, coastal erosion, hailstorms and drought. They continue to form potential risks to people, buildings, transport infrastructure, communities and the economy as a whole, despite the fact that the country is among the most urbanised and developed in the world (Dwyer, et al., 2004). For example, major floods are a frequent occurrence to isolate towns, disrupt road and rail infrastructure, and are a common cause of large-scale damage and deaths. Types of flooding can range from catchment floods (following prolonged rainfall) and coastal flooding to flash floods and tsunamis. Due to the vast scale of impacts, they remain as the most damaging hazard in Australia (Australian Institute for Disaster Resilience, 2009). The risk of tsunami exists despite the fact that historically, they have only caused locally significant inundation (Australian Institute for Disaster Resilience, 2018). The country is surrounded by some 8,000 kilometres of active tectonic plate boundaries, which have the potential to generate tsunamis that could reach the shores within two to four hours. The risk is exacerbated by high exposure; 50 percent of the population live within 7 kilometres from the shoreline, and high numbers of industrial facilities and infrastructure are located at the coast (Australian Institute for Disaster Resilience, 2018).

Tropical cyclones, the “East Coast Lows” and those occurring on northern and western coasts between Brisbane and Perth can also bring in significant amount of precipitation which can result in large-scale damages especially in urban areas (Kron, 2016). They usually occur between November 1 and April 30. Other wind hazards resulting from intense low-pressure systems can also have severe impacts anywhere in Australia, similarly to tornadoes. However, tornadoes are poorly recorded due to the fact that they occur in sparsely inhabited regions in the south-western and eastern parts of the continent.

Earthquakes can also affect Australian territory, despite the fact that the country has not experienced an event higher than magnitude 7 since the seismic record keeping began in the late 19th century (Geoscience Australia, 2019a). Seismic activity reaching magnitude 4.0 or higher with a 5-year return period is relatively common in Western Australia in the Meckering region, but the vastness of the continent limits the effectiveness of earthquake estimation in the country (Geoscience Australia, 2019a).

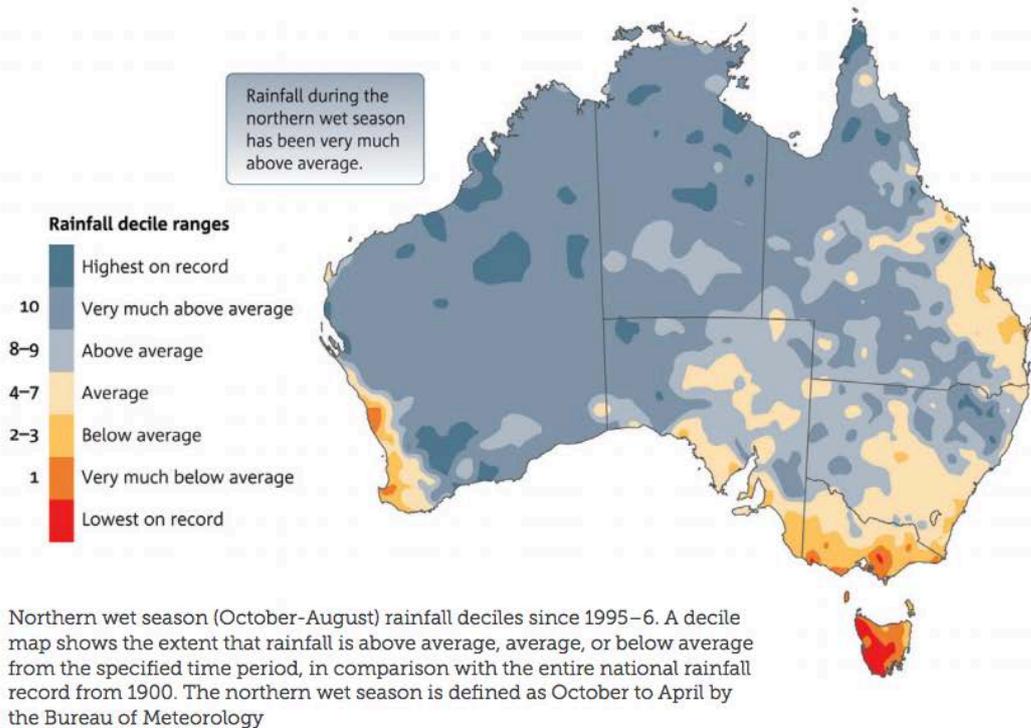
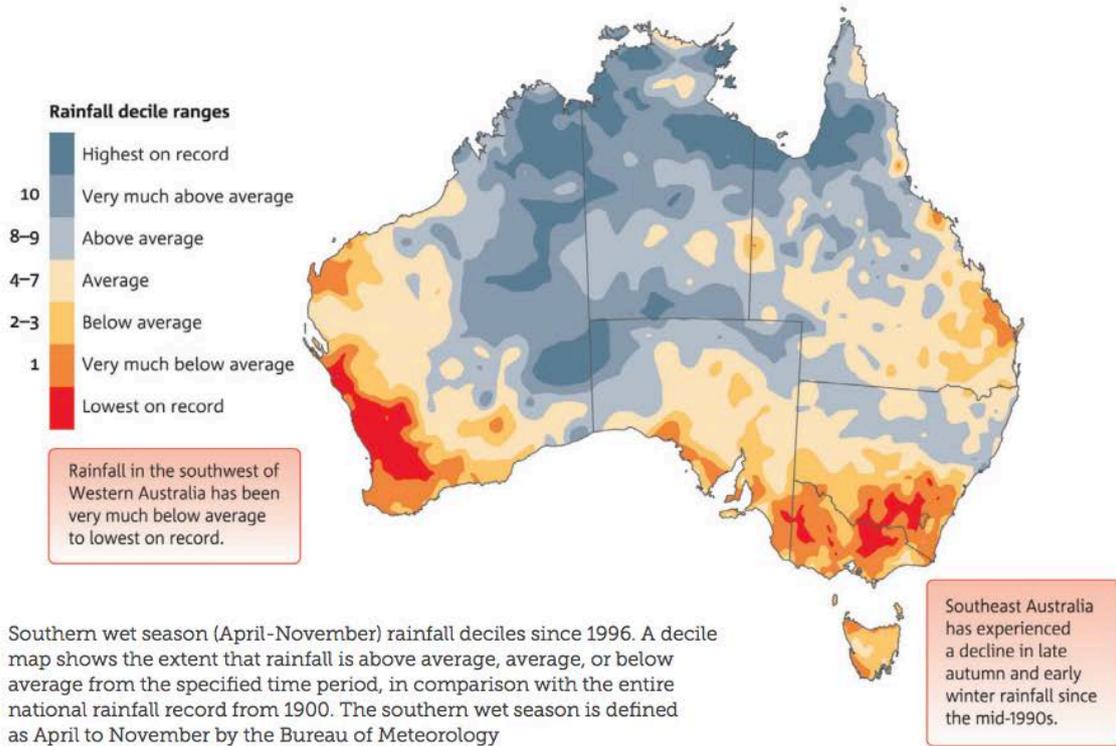
Bushfires and grassfires are common throughout Australia due to the hot and dry climate, and they can cause significant damage to crops, livestock and farming infrastructure any time of the year depending on the location as the continent is characterised by varied fire seasons (Geoscience Australia, 2019b). Bushfires (while slow-moving) can have a significant heat output, occurring depending on the fuel loads (i.e. fallen barks, leaf litter, branches), fuel moisture, slope angle, wind speed and temperature.

Finally, droughts – despite being a natural part of Australian climate – pose a significant risk to lives and livelihoods, and they are common given the fact that Australia has the lowest rainfall of all inhabited continents (Department of Agriculture, Fisheries and Forestry, 2012). Severe droughts affect the country on an 18-year return period, some of which are localised and do not necessarily occur in association with El Niño events, thus making them difficult to predict (Department of Agriculture, Fisheries and Forestry, 2012).

Given the frequency and severity of hydrometeorological hazards now, climate change exacerbating these trends may have destructive impacts to the economy and society during the upcoming decades. It is likely to worsen drought conditions in southwest and southeast regions of the country, affect health, agriculture and native species, and contribute to water scarcity in urban regions (Steffen, 2015). For example, water inflows to key Sydney dams including Warragamba and Shoalhaven could decrease by 25 percent by 2070 under current GHG trajectory, and heat stress could further exacerbate mental health issues, cause future productive losses of US\$ 3.7 billion annually, and destabilize fragile ecological systems hosting numerous unique fish and invertebrate species found only in Australia (Steffen, 2015). However, the impacts of climate change-driven changes do not affect the country equally, but have high spatial characteristics (Figure 4).

Still, the number of record-breaking hot days has doubled during the past 50 years, heatwaves have become hotter, and southern Australia has experienced an unprecedented drying trend – impacts of which are likely to exacerbate fires, but also increase the prevalence and impact of flash flooding due to unusual rainfall patterns (Glasser, 2019). Furthermore, the impacts of hydrometeorological hazards may create complex feedback cycles and prolonged emergencies. For example, in 2018, Queensland was affected by a severe drought, which then contributed to more than 140 bushfires, followed by another extreme heatwave which combined resulted more than record-breaking million hectares destroyed bush and farmland (Glasser, 2019). Days later, Cyclone Owen made a landfall onto Queensland's coast – only to be followed by another period of drought weeks later which killed hundreds of thousands of cattle (Glasser, 2019). These impacts of reoccurring and complex hydrometeorological hazards building on one another may constitute to prolonged stress to ecological and human systems which may have catastrophic long-term implications to future development, economic growth, sustainability, wellbeing and resilience.

Figure 4. Long term changes in rainfall across Australia (CSIRO & BoM 2014 in Steffen, 2015).

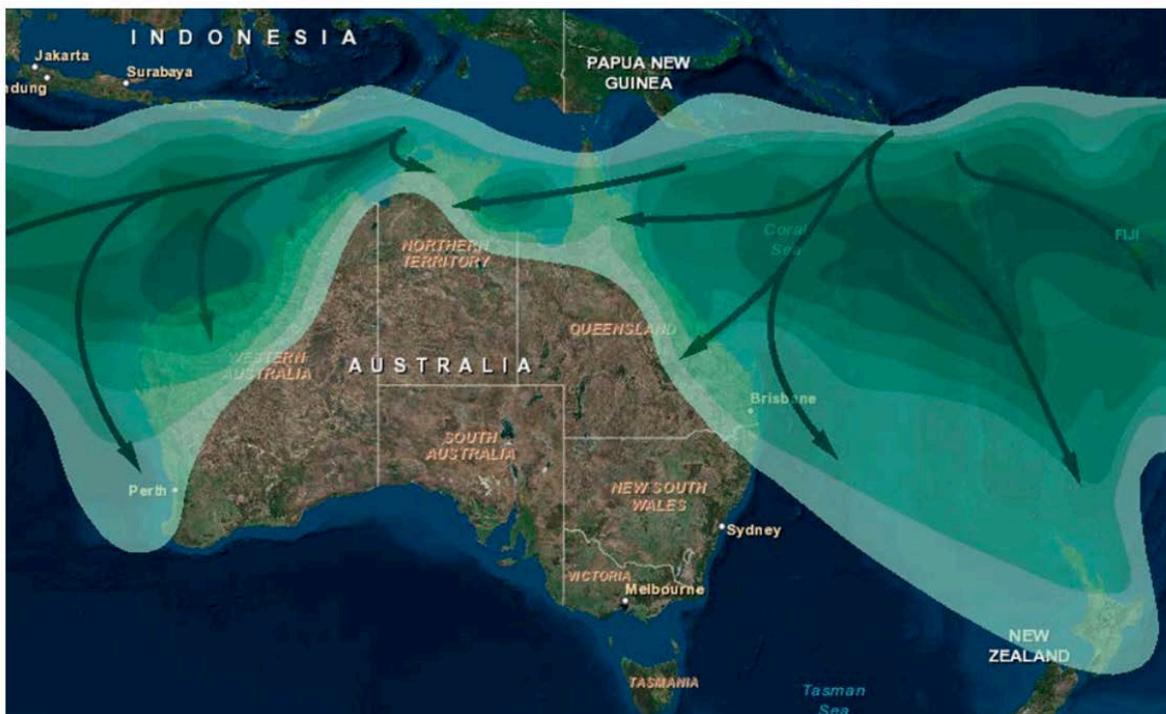


2.2 Exposure

What constitutes to disaster risks is a cornerstone of assessing the levels of danger hazards pose to any given society. Thus, exploring the extent of assets and people exposed to them in Australia is necessary. However, as of now, there is no comprehensive information system available which would provide an overview about the elements of various sectors exposed to hazards across the continent (Nadimpalli, et al., 2018). Nevertheless, this chapter intends to provide a brief overview of some of the country's exposure to hazards.

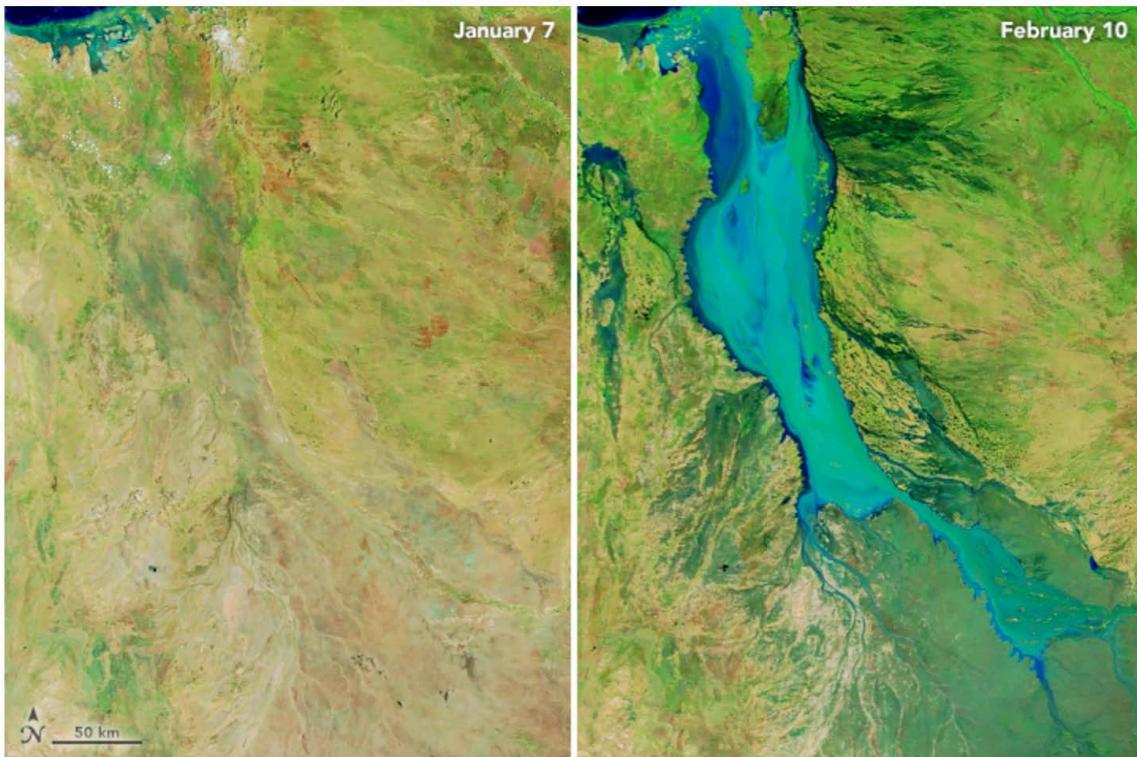
While cyclones rarely make landfall to the east coast of southern Queensland, changing climate may increase the risk of cyclones to Greater Brisbane which remains exposed to the risk of tropical storms that is also among the regions with the highest loss potential (Anwender, 2017). Cyclones may also affect most of the northern and western coast to a varying degree, where a number of high-productivity cities are located (figure 5).

Figure 5. Average occurrences and paths of cyclones affecting New Zealand and Australia (Anwender, 2017).



Most of the country's high-value assets, cities and industry are located near the coastline, which increases the risks of numerous hydrometeorological hazards such as flooding, storm surges, sea-level rise and high precipitation. For example, the heavy rains occurring between January and February in 2019 affecting Queensland caused massive losses to farmers in the vicinity of the river catchments flowing to the Gulf of Carpentaria, which spilled to cover an area of over 60 kilometres in width (figure 6). It was estimated that the event killed up to 500,000 cattle which were weakened by the period of preceding drought (Smeed, 2019). The event was also significant due to the fact that about half of Australia's cattle production is located within the state, indicating that similar disasters may have implications to farmers' livelihoods and their ability to sustain graziers.

Figure 6. River catchments flowing towards the Gulf of Carpentaria in Queensland during the summer floods between January 7 and February 10, 2019 (NASA, 2019).



Flooding has high spatial variability, but flash flooding, in particular, can occur anywhere in Australia. Largest flood-related losses have been expected to occur in Queensland and along the entire East coast (Kron, 2016). Safety of people and susceptibility of infrastructure are linked to flood behaviour, varying across floodplains depending on the location, and sometimes in association with cyclones. Conversely, rainfall deficiencies leading to droughts have been affecting southern and eastern Australia disproportionately over the past decades. From late 1996 to mid-2010 southern Australia experienced unusually dry conditions, which affected Perth, Adelaide, Melbourne, Canberra, Sydney, Brisbane and Hobart periodically as was seen in Figure 4 (Bureau of Meteorology, 2015).

Largest fires usually occur in the Northern Territory, and in the northern areas of Western Australia and Queensland (Geoscience Australia, 2019b). Between 1901 and 2011, bushfires have been associated with 825 fatalities, 85 percent of which occurred within 100 meters of a forest often during unusual fire conditions (Blanchi, et al., 2014). Furthermore, as cities and their peripheries expand, fire damages are becoming more common. In the case of 2009 Black Saturday fires in Victoria, 85 percent of destroyed housing were in (25 percent), or within 10 meters (65 percent) of bushland boundary (Crompton, et al., 2010).

2.3 Socio-Economic Vulnerability

Exposure and socio-economic vulnerability are often interlinked. People rarely choose to inhabit remote or exposed areas, but rather, are forced to stay in peripheries of growing cities due to housing prices, cost of transport and low-income, while still being compelled to move in the search of seeking services and opportunities (Booth & Tranter, 2018). Poverty (or conversely, high-income) is geographically concentrated in Australia (Biddle & Markham, 2017), and in 2018 there were over 3 million (13.2 percent of the population) living below the poverty line of 50 percent below the median income (ACOS & UNSW Sydney, 2018). Lower-income populations tend to inhabit rural regions and peripheries of major cities, have reduced access to services such as health, education and transport (ACOS, 2013; Parliament of Australia, 2019), which not only exacerbate poverty but are also interlinked with higher vulnerability and deprivation. For many, rent is unaffordable in Australia's major cities, and house prices have risen by 400 percent over the past two decades while the average incomes have increased only 120 percent (ACOS, 2013).

Yet, poverty does not affect people equally. They are correlated with factors such as disabilities, age, migrant or refugee origin and indigenous heritage (Parliament of Australia, 2019). For example, elderly have more than 30 percent chance of living in poverty, which is among the highest estimates in the OECD (Sila & Dugain, 2019). These demographic characteristics affecting poverty combined to remoteness and disproportionately higher economic and social costs of disasters lead to social stratification and scales of vulnerabilities across Australia (Department of Home Affairs, 2018). This stratification is likely to be exacerbated by climate change. Some areas affected by worsened flooding experience increasing insurance premiums which are expected to double or triple within decades, even to an extent where the number of "uninsurable" addresses exceeds 700,000 homes (Ting, et al., 2019). Droughts affect housing as well; 3 percent of properties in Australia are built on soil which can damage foundations during ground contraction and breaking during drought conditions (Steffen, et al., 2019). Thus, people in such housing cannot sell their homes, cannot access risk-transfers and cannot afford to move, leaving them into a poverty-trap within high-risk zones habitually affected by hydrometeorological hazards.

Alongside poverty, vulnerability is also determined by hierarchies of power determining access to services, information, employment opportunities, support and care. For example, bushfire awareness and preparedness training in southeast Australia are shaped by the societal perception of patriarchal gender roles and relations which creates disengagement among women, thus leading to lack of bushfire preparedness (Eriksen, 2014). Women are also disproportionately represented in poverty statistic (ACOS & UNSW Sydney, 2018), which is related to parenthood. Being a single parent has been identified to correlate with higher poverty – and, in 2016, 81.1 percent of single-parent families were led by mothers (Australian Bureau of Statistics, 2016). Conversely, men can be more affected by post-traumatic stress disorders or other mental health issues caused by disasters due perception of masculinity which prevents them from accessing support, as was identified among firefighters involved in bushfires (Eriksen & Waitt, 2016).

Similarly, discrimination against other groups may lead to heightened vulnerability. Perception of refugees lacking capabilities or education may lead to marginalization within the Australian society (Neikirk, 2017), which can reduce social capital and networks which are an important part of individual and family resilience. Social exclusion of those belonging to LGBTIQ+ groups can also lead to lower participation, and experienced discrimination

is linked to suicides, self-harm, other mental disorders, depression and substance abuse (National LGBTI Health Alliance, 2016; Demant, et al., 2018), which have myriad of implications to vulnerability, homelessness and poverty. Considering these social dimensions is elemental in understanding scales of disaster vulnerability in Australia.

2.4 Physical Vulnerability

Decisions and choices made at a time of relative stability and prosperity have inadvertently contributed to eroding resilience due to the placement of communities and infrastructure in a manner that has overlooked future implications of the risks of natural hazards in the country (Department of Home Affairs, 2018). Thus, the development has led to an increase in physical vulnerability as well. Most importantly, loss of resilience in urban regions has been caused by the erosion of natural environments and ecological systems as a result of urban expansion, which imposes immense stress on ecological systems, water and air quality, and contributes to the loss of natural resilience (Coleman, 2016). For example, healthy wetlands in Australia can mitigate flooding impacts, block fires and protect the environment from the worst impacts of drought and extreme weather. Similarly, coastal marshes and mangroves act as a defence from inundation and storm impacts (Department of Environment and Energy, 2016). Managing environmental degradation vis-à-vis for growth is of paramount importance to reduce vulnerability and exposure of systems to natural hazards and climate change. It is also linked to sustainable development and the government's mandate to provide Australia's citizens safe and inhabitable living space now, and in the future.

It is also important to acknowledge that interconnectedness of modern systems influence resilience and vulnerability in an adverse manner, especially in a highly developed context. Critical services are increasingly dependent on one another, including communications, fuel or food supply or electricity, which then affects the governments and private sector's ability to provide services during, and in the aftermath of disasters (Department of Home Affairs, 2018). Failure of one part within this network may have ripple-effects throughout society, which increases the vulnerability of not only the physical systems, but also people who may be more dependent on services and societal networks than those living in more "robust" terms. Supply chains are also more vulnerable to global fluctuations, due to which centralised provision of critical services should be increasingly highlighted, especially in locations prone to frequent hazardous events (Department of Home Affairs, 2018).

Hazards also affect different industrial sectors of the society to a varying degree. For example, agriculture remains among the most climate-sensitive sectors of the Australian economy due to the impacts that changes in rainfall, soil, water availability, pests and diseases may have on crop outputs. Understanding these dimensions of not only built systems, but also social, natural and economic environments are fundamental for adequately estimating risks of natural hazards and climate change in Australia (Department of Home Affairs, 2018).

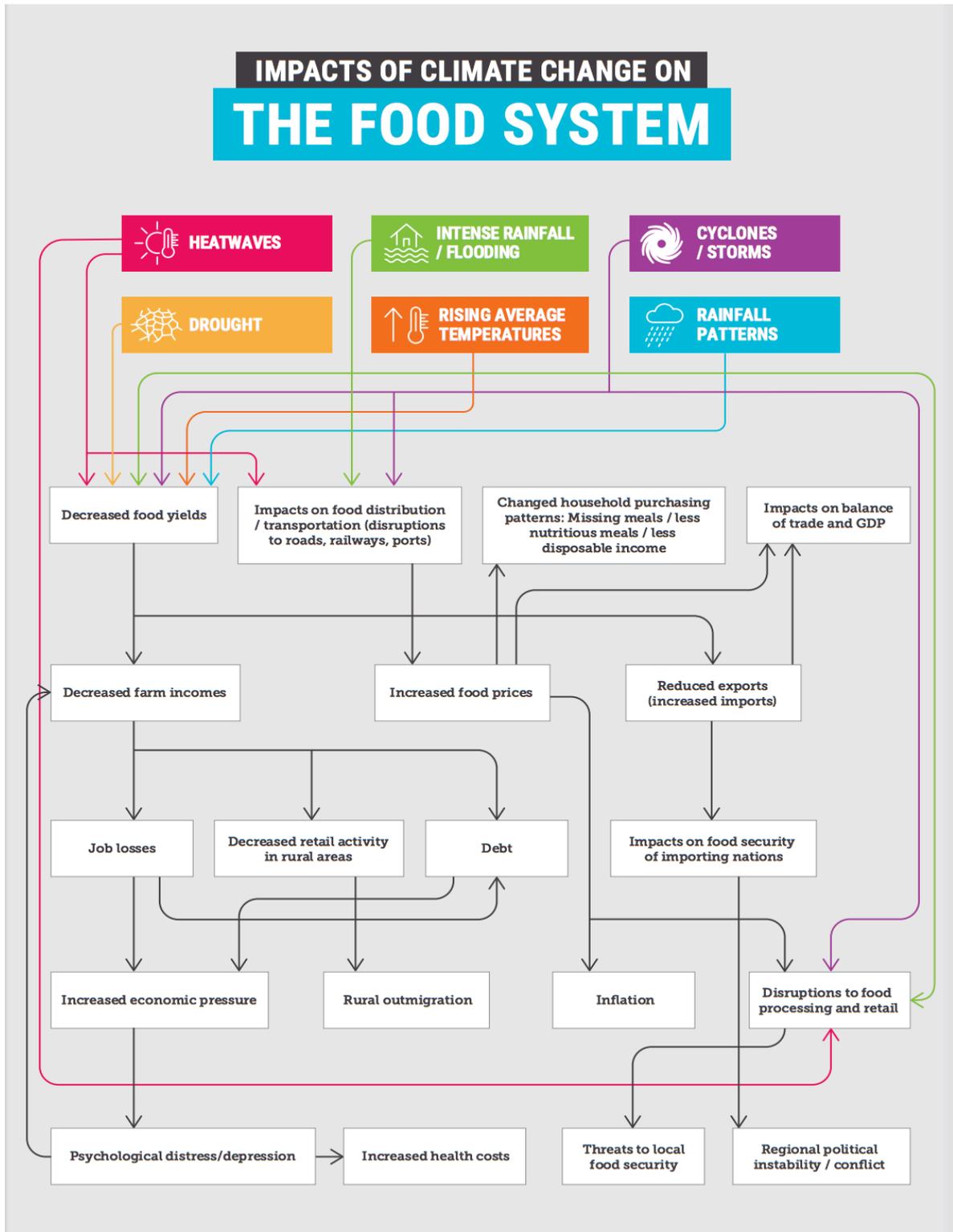
2.5 Future Disaster and Climate Risks

As has been explored in the previous chapters, climate change has the potential to offset ecological systems, economic and social development in Australia, and severely endanger the health and livelihoods of the people across the continent (Department of the Environment and Energy, 2019). The frequency and severity of hydrometeorological hazards are expected to increase, the number of record hot days has already doubled during the past 50 years, rainfall and droughts have both experienced abnormal fluctuations and sea-level has risen steadily since 1993 (Glasser, 2019). Low-lying facilities and housing near rivers and coastlines are at a particularly high risk, and assets worth more than US\$ 156 billion will be exposed to sea-level rise alone by 2100 under current GHG trajectory (Steffen, et al., 2019), which is a grave concern since the coastal regions generate most of the economic activities and host 85 percent of the population.

These impacts are particularly severe on agriculture which accounts for 58 percent of the country's land use, 14 percent of all exports (2016-2017) and 2.7 percent of the value-added GDP (Jackson, et al., 2018). Cumulative damages to agricultural and labour productivity caused by climate reach could reach nearly US\$ 3 trillion by 2100, which may severely hinder the food value chain, income and employment (Steffen, et al., 2019). Such impacts have further effects on future investments to industry and insurance, migration, mental health and even conflict (figure 7), which highlights the importance of considering the interaction of various social, environmental and physical systems from a holistic perspective.

Pressures arising from climatic and anthropogenic causes have had cumulative impacts on the fragile marine and terrestrial ecological systems as well. Climate change, land-use, habitat fragmentation and invasive species have all contributed to significant degradation and loss of natural space, which add to the high risks (Jackson & Rankin, 2016). Patterns of chance can also lead to persisting feedback loops which support the formation of vulnerabilities and loss of resilience. For example, increasing impacts of slow-onset hazards such as droughts may significantly magnify the impacts of sudden on-set hazards such as flooding, as was seen the case of Queensland floods (Glasser, 2019). Similarly, drought-induced canopy diebacks can result in increased fuel loads, lead to a loss of habitat for myriad of species of fauna and flora, and instigate irreversible change in the Australian landscapes (Hoffman, et al., 2018).

Figure 7. Impacts of climate change to the food system in Australia (Steffen, et al., 2019)



3. Disaster Risk and Climate Action Interventions

Priority 1. Understanding Disaster Risk Improving the understanding disasters and climate change requires an increasing amount of information and data to be used to guide risk-informed planning, analysing disaster situations for response, vulnerability, risk and capacity mapping, as well as to adequately prioritize investments in contexts which are often stressed for money and time. Bridging data gaps, dismantling barriers to managing and utilizing data, improving the ability to project disaster trends, and investing in supporting long-term and solution-driven research are indeed necessary given the risk profile of Australia. In the light of this, the federal government has implemented measures such as the National Emergency Risk Assessment Guidelines and impact assessments to improve national level evidence base and the understanding of risks in the country. However, multitude of separate agencies and institutions host and manage data covering natural hazards, vulnerability and resilience attributes in the country, and the harmonization of data collated and stored by different means among existing systems remains a challenge (Fraser & Hawkins, 2014).

However, the Government does maintain a database compiling disaster impacts in an open database, receiving updates from federal, state and local agencies (Australian Government, 2019). Geoscience Australia maintains a Flood Risk Information Portal, categorising all flood studies conducted across the country to efficiently collate available information about flood risks (Geoscience Australia, 2019). Also, the foundations of risk mapping are built on baseline elements such as location of housing, socio-economic data, elevation, land-use, regional weather or vegetation, which then gets combined to hazard data (including seismic zones, flood maps, storm tide analyses etc.) all of which are hosted by different government agencies (Australian Business Roundtable, 2014). Also, due to the nature of disaster management in Australia, many of the States and Territories have developed their own sophisticated mechanisms and understanding of contextualized impacts of hazards, which reinforces gaps between information sourcing from different origins. Still, a coordinated and a uniform approach to data dissemination, analysis and management is required which supports public access and local-level participation, not to mention addressing the existing data gaps in the case of many hazards and particularly, climate change.

These concerns are reflected in the National Disaster Risk Reduction Framework (NDRRF), which identifies intervention strategies for 2019-2023 to improve data management Australia (Department of Home Affairs, 2018). To fully understand the rich picture of disasters in the country, vulnerability, capacity, exposure of persons and assets, hazards and the environment must be assessed vis-à-vis the requirements in terms of available technology, capacity of staff and investments required to instigate this change (Department of Home Affairs, 2018). Institutions including the University of Melbourne have already developed systems such as Australia Disaster Management Platform seeking to improve dissemination of existing information to guide decision-making to the spectrum of officials involved in emergency planning (The University of Melbourne, 2017). Existing solutions for problems in data management and dissemination could be explored further to identify interventions under the NDRRF. Australian Emergency Management Knowledge hub is also available to communities, business and government agencies, which provides research, resources, information, media and statistics about past events.

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk Australia has developed a robust institutional framework for managing disasters, aligned with international mandates and agreements on DRR, sustainable development and climate action at the national and sub-national levels. Also, the spectrum of responsibilities in prevention, preparedness, response and recovery are shared between government, private sector, non-governmental institutions as well as communities and the individuals. However, there is no single legal position for disaster and emergency management (apart from the mandates of the Constitution); the arrangements vary from civil contingency provisions to comprehensive emergency management depending on the state or territory (Eburn, 2017). This follows the position of the Commonwealth, which does not have any specific power over disaster management due to its lack of legislative authority over states and territories. Thus, the Commonwealth sees its role as a provider of funding and federal assets to assist states before and after disasters in the absence of overarching national disaster legislation (Eburn, 2017).

Responsibility over federal emergency management lies with the Emergency Management Australia (EMA) as the administrative unit operating within the Attorney-General’s Department. However, EMA operates without legal mandate, legislation or Cabinet endorsement with which to take command over emergencies, which creates significant problems in managing the institutional relationships within the command structure. Challenges will be further discussed in Chapter 7.

Table 1. Australia’s legislative plans and policies intended to improve disaster risk reduction and climate resilience

IMPLEMENTATION	PLAN/POLICY	SCOPE	PURPOSE
COMMONWEALTH OF AUSTRALIA, STATE AND TERRITORY GOVERNMENTS	Emergency Management Act (2004)	Federal, States, Territories	The Act provides the foundation for the protection of life, property and the environment in an event of an emergency, outlines emergency management arrangements and acts as the foundation of disaster-related operations in Australia.
NATIONAL RESILIENCE TASK FORCE	National Disaster Risk Reduction Framework (2019-2023)	Federal, States, Territories, LGUs, relevant stakeholders	Multi-sector collaboration strategy to improve the coherence of DRR and CCA activities and interventions among stakeholders, aligned with the mandates of SFDRR, SDGs and the Paris Agreement
SHARED RESPONSIBILITY	National Climate Resilience and Adaptation Strategy (2015)	Federal, States, Territories, LGUs, relevant stakeholders	Set of principles to guide adaptation practice and resilience building across sectors and levels of government
COMMONWEALTH OF AUSTRALIA, STATE AND TERRITORY GOVERNMENTS	National Drought Agreement (2018)	Federal, States, Territories	Agreement building on on-going drought policy reform initiative towards improved preparedness, response and recovery, and to facilitate cooperation and collaboration between the Commonwealth, states and territories

IMPLEMENTATION	PLAN/POLICY	SCOPE	PURPOSE
COMMONWEALTH OF AUSTRALIA, STATE AND TERRITORY GOVERNMENTS, PRIVATE SECTOR	Australian Government Drought Resilience, Preparedness and Response Plan (2019)	Federal, States, Territories, Farmers and communities	Improving the preparedness of farm business and rural communities through establishing drought as a regular feature of Australian landscape as opposed to a disaster. Focuses on immediate action (support) support for wider communities and long-term resilience and preparedness

In response to the lack of national strategies and plans, the central government has made significant strides towards addressing disasters and climate risk reduction from a holistic perspective with respect of the states' autonomy. The most recent National Disaster Risk Reduction Framework for 2019-2023 is the first such document (aligned with the SFDRR, SDGs and the Paris Agreement) developed jointly with all states, territories, local governments and private sector representatives to outline a strategic approach the stakeholders must share to reduce climate and disaster risks in all sectors of the society (Department of Home Affairs, 2018). It gives due consideration to exposure and vulnerabilities, complex emergencies and their costs, as well as the interconnectedness of critical services vis-à-vis growing risks of hazards and climate change, successful reduction of which requires a whole-of-society approach.

Similarly, the states, territories and the Commonwealth have reached an agreement on managing droughts through joint efforts by prioritising preparedness, sustainability, resilience and risk management (Department of Agriculture, 2018). The document, titled the National Drought Agreement, provides a framework for enabling consistency throughout drought policy and reform objectives across the country to avoid doubled efforts and wasted resources. For climate action, the National Climate Resilience and Adaptation Strategy provides guidance for effective mitigation, adaptation and resilience by provision of best practices, knowledge and framework for sectoral interventions (Commonwealth of Australia, 2015).

Priority 3. Investing in Disaster Risk Reduction for Resilience Disaster funding and finance is essential for governments to guarantee not only the ability to conduct response and recovery, but also to ensure contingency of services and adequate resources for undertaking pre-emptive disaster risk reduction and climate action. The NDRRF of 2019 sets out basic outline for program design and resource allocation, alongside guidelines for investment and spending. However, each state and territory have their own legislation for emergencies and disasters – thus, the main responsibility over disaster finance lies with the sub-national governments in their respective states (Portillo-Castro, 2019). However, arrangements exist for the Commonwealth to provide assistance. The Disaster Recovery Funding Arrangements (DRFA, 2018) is the main mechanism with which the Commonwealth may provide assistance to states and territories via cost-sharing arrangements when disasters cause significant financial burden to local operations (Department of Home Affairs, 2018). DRFA categories include emergency assistance for individuals, for repair of public assets, for community recovery and for “exceptional circumstances” (Department of Home Affairs, 2018), which may be redirected to hazard mitigation activities wherever reconstruction and relief projects so allow (Portillo-Castro, 2019). Yet, spending on mitigation and preparedness remains low due to heavy weighing towards relief and recovery (Andrews, et al., 2016); in fact, 97 percent

of all disaster funding was spent on relief and recovery in 2014 (Productivity Commission, 2014). Additionally, the states and local governments continue to raise less money than they require for the expenditure – thus limiting the efficacy of local disaster financing below the Commonwealth (Productivity Commission, 2014).

For individuals, the government provides disaster recovery payments (one-off) and disaster recovery allowances (short-term income support) to assist those directly affected by major events. In this context, the Social Security Act of 1991 is an important element of institutionalised social protection, intended to support those vulnerable, in the risk of, or living in poverty and those without access to full means support themselves throughout the country.

Additionally, for the governments and individuals, insurance is an important element of disaster finances in Australia. However, less than 40 percent of all disasters caused by natural hazards are pre-funded by insurance in the country (Andrews, et al., 2016). But, while they can be an effective tool for transferring risks especially within government-private sector nexus, overemphasizing insurance as the main risk management tool should be treated with caution. At the house-hold level, under-insurance seems to be reproduced along socio-economic and geographic boundaries, rendering those with lower socio-economic status or within cities to have lower insurance coverage (Booth & Tranter, 2018). Also, the prioritization of insurance as the main form of risk-transfers to households shifts responsibility (and blame) onto households (Booth & Tranter, 2018), which automatically excludes those who cannot afford insurance, for example. Thus, exploring risk financing in Australia should be done from a perspective which considers the spectrum of political responses and responsibilities, and exceeds profit-seeking aspirations in recognition of the fact that such systems are inherently built in a manner that is not accessible for everyone.

Priority 4. Enhancing Disaster Preparedness for Effective Response to “Build Back Better” in Recovery, Rehabilitation and Reconstruction The Australian Disaster Preparedness Framework (ADPF) has been developed with the intention to improve the capability, capacity, quality and availability of technical and non-technical resources to respond and manage catastrophic disasters (Department of Home Affairs, 2018). It is built in acknowledgement of the fact that large-scale events may be transboundary, and sometimes require not only national, but also international support of various governmental and non-governmental sectors. It is a guidance outlining national preparedness principles for all jurisdictions (Department of Home Affairs, 2018). It also outlines the provisions for effective response through highlighting the importance of effective governance which considers response and recovery, coordination, capacity and capabilities, alongside investments, risk understanding and financing of response. The intention is to scale down the implementation from national level through the state and territory governments, but the realization of aspirations relies on the local capacities. Under the NDRRF, intention is to establish a national mechanism to further oversee these efforts and cross-sector dependencies.

In terms of response, the approaches and institutional frameworks vary depending on the state and territory given the high degree of localization of disaster and emergency management solutions within their constitutional responsibilities. However, the DRFA discussed in the previous chapter also facilitates cross boundary support, complemented by the Australian Government Disaster Response Plan (COMDISPLAN) (Australian Government, 2017). COMDISPLAN outlines the coordination arrangements for the provision of non-financial assistance within and outside Australian territory, defining roles and responsibilities

of stakeholders under the lead of the Government Crisis Coordination Centre, operating through EMA (Australian Government, 2017).

Well-functioning and comprehensive Early Warning Systems (EWS) are an important element of preparedness and response as well. EWS in Australia are based on basic principles, and the responsibility issuing them lies with various authorities at the national, state and territory levels (such as the Bureau of Meteorology for Hydrometeorological Events). Still, partnerships remain crucial among the stakeholders to guarantee adequate, timely, efficient and accurate delivery of all warnings across the continent. They are also scaled down to community levels in the cases of bushfires, floods, cyclones and tsunamis to guarantee that messages reach targeted audiences, in consideration of languages spoken, age, socio-economic disadvantage, coverage of telecommunication and access conditions (Australian Institute for Disaster Resilience, 2018).

Considerations for Building Back Better (BBB) in Australia follow current best practice (in theory) – yet, a trend remains to reconstruct damaged roads, buildings and utilities to their original state without intentions to improve (Bergin, 2016). The reasons behind under-implementation of considerations for future resilience are manifold, however, they have been traced to lower reimbursement rates, high administrative burdens (financial and capacity) and the lack of budget allocation from the Australian government for the states and territories (Productivity Commission, 2014). Stronger national efforts are required in the form of sufficient knowledge and funding to improve infrastructure and systems in the aftermath of disasters (Bergin, 2016).

4. Coherence with Sustainable Development Goals and the Paris Climate Agreement

It is increasingly important to create coherence among national and sub-national level legislation, frameworks and planning while seeking to implement SFDRR and the Paris Agreement, and to graduate from the SDGs given the fact that all these mandates share similarities and priorities. Identifying synergies within existing institutional mandates and harmonizing them to reduce overlapping, doubled efforts and funding is necessary due to the nature of policy-planning which tends to gain momentum ex-post disaster situations, leading to mounting numbers of documents which may be left unrevised.

In Australia, significant efforts have been targeted towards increasing coherence among recently designed and implemented national-level frameworks to guarantee due consideration for all of the aforementioned frameworks to respond to challenges resulting from oversight often occurring among practitioners conducting DRR, CCA and development planning, often treating these as separate issues. The new Disaster Risk Reduction Framework for 2019-2023 sets an excellent example of targeted and harmonized national level planning. Similarly, National Climate Resilience and Adaptation Strategy (2015) has been developed in consideration of SFDRR and sustainable development.

However, given the fact that the political agendas of the governments making up the federation are not identical, gaining and maintaining momentum for cooperation will remain difficult and consuming (Carroll, et al., 2016). The governments also then have varying regulatory capacity, sometimes more limited human and economic resources, and lesser capacity to conduct governance (Carroll, et al., 2016) as envisaged by the federal government, which will certainly constitute to the myriad of issues in creating coherence among the states and territories vis-à-vis federal level priorities, targets and goals. However, in terms of climate change, all of the state governments have explicitly recognised it as a priority issue, indicating that positive change is achievable through joint efforts.

5. Issues in the Implementation of Disaster Risk Reduction and Climate Policy

Finding synergies and integrating CCA and DRR comprehensively into policymaking in Australia is an increasingly pressing concern given the challenges to governance which varies depending on states and territories. In the past, responsibilities related to climate and disaster risk are often dispersed or duplicated in terms of interventions, and it still hinders full integration of proposed implementation at different levels of government below the federal level (Forino, et al., 2017). While high autonomy certainly brings benefits (such as contextual knowledge for prioritization and potential for community representation), discrepancies remain between state/territory and local governments. LGUs are ranked low in public affairs management, their capacities may be low, and they cannot directly apply for federal funding (including DRR and CCA) without the involvement of the state government (Forino, et al., 2017), which creates another gap between federal, state and local levels. A study looking into strategies of a few LGUs revealed that while they tend to integrate DRR and CCA into their respective planning, but evidence of successful implementation remains scarce, and whatever planning is place maybe undermined if programs and priorities between state and local governments remain unaligned, or if they have conflicting objectives (Forino, et al., 2017).

Additionally, governments are facing challenges in terms of urgency of disaster and climate issues, but also the demands to reduce public sector spending, reduce public debt and cut taxes while trying to cope with 'wicked problems' with archaic institutional design (Howes, et al., 2015). In Australia, the government's system has not been designed to address complex policy concerns which require integrated responses at all levels, but rather it encourages duplication and jurisdictional disputes (Howes, et al., 2015) as has been evidenced earlier as well.

Also, climate-related policy assumptions, strategies, funding and operational arrangements in Australia are based on expectations that impacts increase gradually – hence, when such events (as science suggests) grow in severity and frequency more rapidly than assumed, these plans will become outdated at an equal pace (Glasser, 2019). Thus, narrative around DRR and CCA should be focused on the future, compounding and cascading threats in efforts to move away from "business as usual". Unexpected and unexplored impacts such as regional security threats occurring outside of Australia as a result of climate change, and the potential for catastrophic collapse of ecological systems should be adequately reflected in planning with the required urgency, in acknowledgement of the fact that climate-related impacts are always based on careful estimates, and thus, downplayed in policy-making (Glasser, 2019).

6. Stakeholder Analysis

Australia maintains a civil-military approach to disaster management, based on six guiding principles to direct the work of stakeholder agencies. They include employing flexible methods, leveraging organizational diversity, strengthening proactive multiagency engagement, shared understanding and committing to continuous improvement while seeking unity of purpose in preparedness, prevention, mitigation, response and recovery (CFE-DM, 2016). For wider sectoral engagement, the Environmental Protection Agency, the Department of Social Services, and the Department of Health, for example, all maintain their own frameworks for engagement in recognition of the fact that within state and territory governments, communities, academics and the private among others have important complimentary contributions to their operations. These are reflected in the Department of Prime Minister and Cabinet's stakeholder engagement toolkit, which acknowledges the stakeholders' expertise in their respective fields which can widely benefit the governments' operations and further support whole-of-society approaches (Department of the Prime Minister and Cabinet, 2013).

Shared responsibility in Australian DRM is indeed a key theme across the government's frameworks and planning documents, which is largely a legacy of the 2009 Victorian Bushfires Royal Commission's work, followed the National Strategy for Disaster Resilience which rooted the approach into federal policy. However, it has been largely unclear as to what "Shared Responsibility" entails, and what is needed to put it into practice among government and non-governmental stakeholders (McLennan & Handmer, 2014). The NDRRF for 2019-2023 does highlight inclusive engagement of all sectors and diverse stakeholders within its guiding principles and provides suggestion for improving the management of their roles and responsibilities (Department of Home Affairs, 2018). However, the implementation remains as the responsibility of states and territories.

Australia also responds to disasters abroad, is a provider of foreign aid across Asia and the Pacific and partners in mutually beneficial bilateral programs with countries such as Indonesia and the Philippines in efforts to develop DRM and DRR strategies (CFE-DM, 2016). For example, the Australia - Indonesia partnership is a five-year, multi-million-dollar investment program for 2019-2024 to strengthen Indonesia's DRM and to regionally strengthen cooperation between the countries on regional humanitarian issues (Department of Foreign Affairs and Trade, 2019). Multilaterally, the country is engaged in numerous partnerships including ASEAN Preparedness and Response, East Asia Summit, Asia-Pacific Economic Cooperation, OECD, and Multinational Resilience Working Group with EMA having the most active participation and representation in many of the disaster-focused forums.

7. Future Priorities

Given the scope of challenges and limitations of resources, priority issues are always a subjective topic depending on the sector and agency one is consulting. Despite this rather obvious bias, this section intends to provide a more or less objective overview on most pressing challenges the government should prioritize based on evidence collated in this report.

7.1 Challenges

As has been evidenced by this report, disaster management in Australia is a complex task given the interconnectedness of fragile systems facing environmental and anthropogenic stressors, while simultaneously suffering from fragmented policy landscape, inefficiencies and lack of resources and capacity to implement DRR and CCA across the continent in a uniform manner. Mainstreaming local government involvement remains low, and the country remains underprepared for a truly national emergency where the Commonwealth would be expected to assume lead, but lacks the defined responsibilities, roles and legislative authority to do so (Eburn, 2017). To respond to the myriad of challenges within disaster governance, the National Resilience Taskforce has been established. However, it still faces the mounting costs of disaster activities vis-à-vis needs, lack of national disaster mitigation framework and the persisting lack of investment to preparedness (Barnes & Bergin, 2018).

Climate change and its adverse impacts to ecological and human systems remains as the most pressing challenge, especially given the fact that current policy-approaches have been feared not to be far-reaching, comprehensive and tangibly impactful enough to achieve the levels of CCA and mitigation that would be required (Glasser, 2019). This combined to discrepancies in sub-national level governments' DRM systems, their inadequate resources and limited spending on preparedness and mitigation remain to be addressed by the federal government, in consideration of the true needs of states, territories and local governments vis-à-vis their contextual challenges. Sometimes legislative provisions can be inadequate as well. While states and territories have their own comprehensive legislation as per the federal government's strong emphasis on decentralization of disaster governance, the provisions for dealing with local governments can vary from non-existent to significant depending on the region, despite the fact that the government has recognized the importance of bridging this gap (Eburn, 2017).

In terms of disaster data management, many of the systems remain unharmonized and the data is collated by various means, often left without comprehensive, easily accessible and public repository, and is hosted by various agencies and stakeholders across sectors. Lack of information limits the efficacy of risk assessments and risk-informed development, and further contributes to gaps in disaster governance – despite the fact that the federal government has repeatedly stressed the importance of risk-informed land-use planning, mitigation as well as preparedness efforts. These challenges further contribute to problems in prioritization of funding and analysing cost-effectiveness across different approaches to hazards mitigation activities – therefore, evaluative evidence base is also required to monitor the tangible impacts of projects and strategies (Gissing, 2017).

7.2 Priority Issues

To address the existing gaps and fragmentation of governance (while acknowledging its benefits) the federal government should support their policy vision by adopting multi-level planning (a whole-of-government approach), integrated legislation and by establishing network organisations facilitating culture of collaboration, supported by cooperative funding (Howes, et al., 2015). While the federal parliament can make laws to regulate the Commonwealth's response to an emergency, the states, territories and therefore, local governments, still govern their own approach to emergencies (Eburn, 2017). Enhancing their capacities, resources and involvement in federal and state decision-making would be beneficial and necessary to achieve the whole-of-government approach to disaster management. Furthermore, it is necessary to disperse disaster finances while moving away from heavy focus on response and relief towards a more proactive, risk-informed preparedness and mitigation in the form of DRR, CCA and sustainable development. Action plan for DRR and CCA should be developed with the intention to design indicators of resilience at all levels, identify ways to improve the resilience of socio-economic, environmental and physical systems, to increase training and research, increase financial support and to strengthen response capacity throughout the government sectors (Glasser, 2019). Moving away from relief and response dominated spending is especially important to effectively distribute available resources towards all phases of the disaster management cycle.

In this context, comprehensive and harmonized disaster information collection, analysis and management is necessary to guide such pathway, with due consideration given to sharing of knowledge among government and non-government stakeholders and communities. In this regard, community participation and buy-in is necessary as the lowest levels of government, as well as communities and individuals could provide crucial information about local needs while providing their contributions to program design to help integrate the values and attitudes of any given context to planning (Gissing, 2017).

Existing vulnerabilities in Australia must also be considered from a holistic (and proactive) perspective, in acknowledgement of the fact that disaster managers have a role in advocacy and activism within the government to guarantee adequate representation of the needs of those most exposed and vulnerable to reduce their risks. The conditions contributing to vulnerability linked to homelessness, low-income, age, gender and sexual orientation (among others) are structural in nature, and the institutional setting facilitating social stratification within a given society cannot be addressed without addressing the true root causes of inequality. Insurance traps, mounting housing prices, social exclusion, discrimination and other factors leading to a situation where risk and vulnerability share geographical and socio-economic boundaries should – and must – be a concern of those seeking equity in disaster response, relief, preparedness and mitigation.

Despite challenges, the federal government of the Commonwealth of Australia has indeed made significant improvements in managing integrated DRR and CCA across the continent, with the intention to respond to most of these gaps identified in this report. Yet, reallocation of federal budget to increase the support to states, territories and LGUs within them to facilitate proactive disaster risk management remains to be fully operationalized, which stands in the way of moving towards the actualization of aspirations below national level. By seeking to achieve comprehensive risk-information management, prioritization of funding can be made possible, after which all other risk reduction activities can be explored to their

fullest extent. Also, while the strong emphasis on localization even to the household level has maintained its momentum and led to positive results in states' and territories disaster governance, their capacity, resources (technical and human) should be brought up to robust standard.

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