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Climate change impacts on vulnerable communities in the coastal zone

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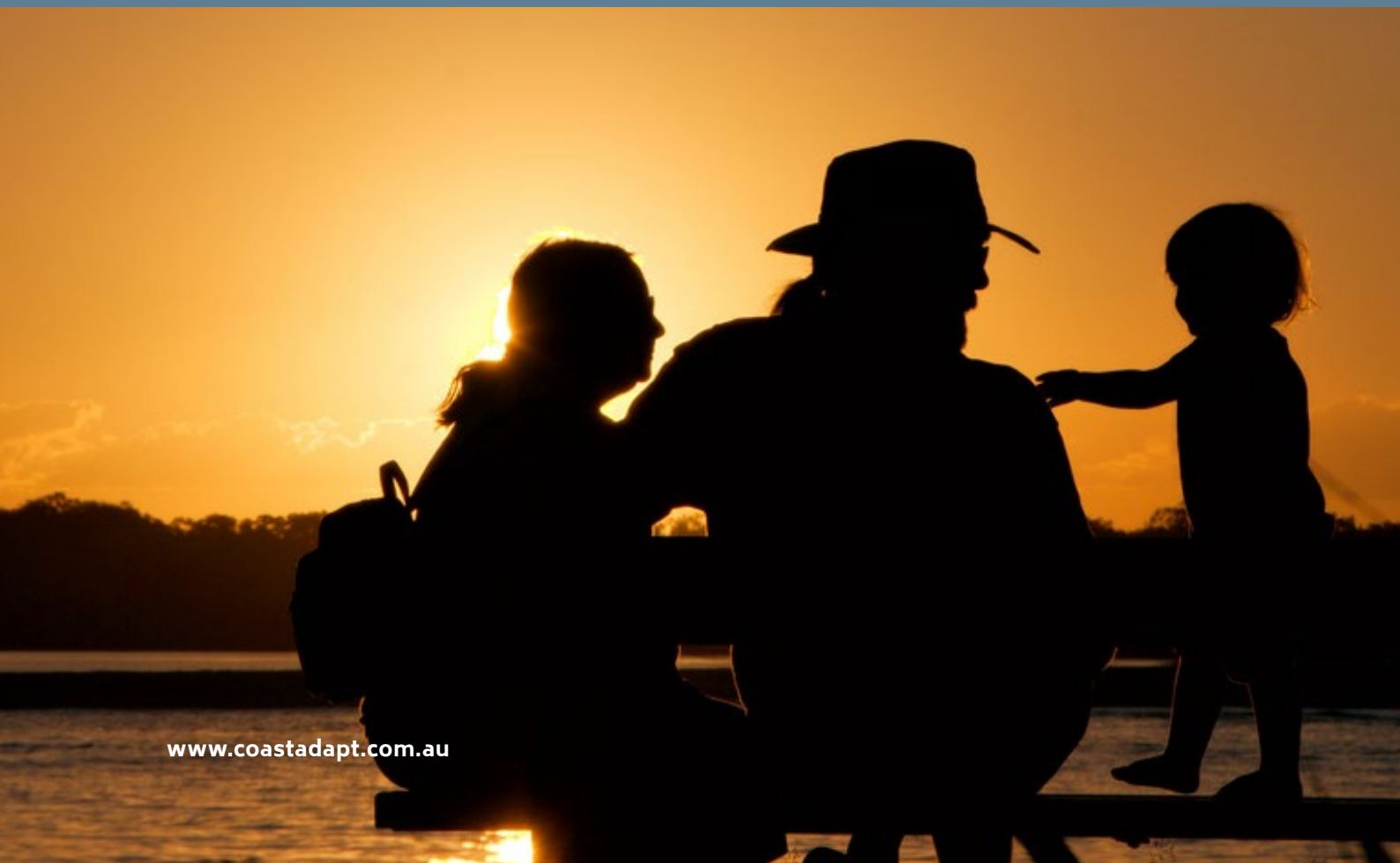
Impact Sheet 9



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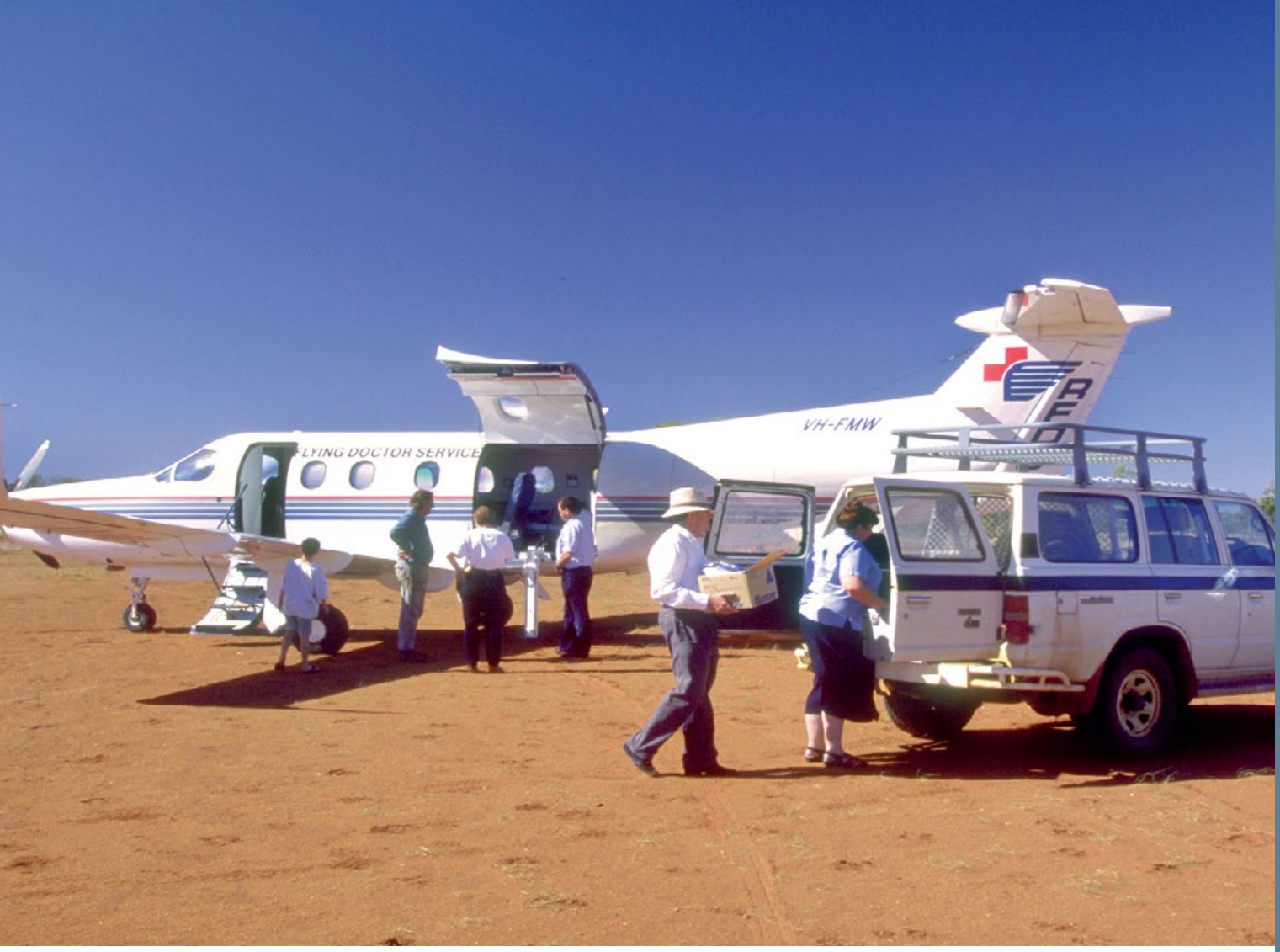

Introduction

Australia's population largely lives in coastal regions, and climate change-induced inundation, attributable to sea-level rise and storm surges, will significantly jeopardise the health, livelihoods and socioeconomic basis of many coastal communities. Other hazards such as heatwaves, storms and drought will also engender serious risk, especially for communities struggling with poor quality housing, poverty and social disadvantage.

Climate change poses serious and accumulating risk to all coastal communities, but socially vulnerable communities are particularly exposed. This is because a community's degree of exposure, vulnerability, resilience and adaptive capacity is mediated by factors such as socioeconomic disadvantage, poor health status, and poverty: for example, where people can afford to live, the quality of their housing, the levels of insurance they can afford and their ability to change their financial situation.

Policymakers must understand the dimensions of social vulnerability in coastal communities to determine which sections of the community will bear the greatest burden from climate change impacts, what can be done to mitigate these risks and how to strengthen adaptive capacity and resilience.

Marginalisation and disadvantage are not sure signs of vulnerability, but they do indicate potentially heightened vulnerability:

- people who are socioeconomically disadvantaged
- people who are homeless or at risk of homelessness
- children and young people

- people with alcohol and other drug addictions
- women and children experiencing or at risk of domestic and family violence
- people from culturally and linguistically diverse backgrounds
- older people
- people with mental health issues
- some Indigenous communities
- people with a disability
- people with chronic health problems.

This review provides a snapshot of current knowledge on the likely climate change impact for vulnerable communities living in the Australian coastal zone. The evidence base for this issue is still developing in Australia, and very few empirical studies have specifically addressed the phenomenon. As a result, this review synthesises findings from different literatures to describe social vulnerability in the coastal zone but acknowledges the significant knowledge gap on this issue.

Social vulnerability to climate change – what does it mean?

Social vulnerability to climate change refers to how structural socioeconomic conditions render coastal communities more or less vulnerable to climate risks (Allen 2003) and affect their ability to cope with, respond to and adapt to climate change–related stresses (Brooks 2003).

Social vulnerability to both rapid and incremental climate change is closely tied to social stratification (Crompton 2008), that is, the segmentation of individuals into social groups, based on their access to resources (financial, material, social and institutional). Thus, a person's social status is an indirect indicator of their ability to absorb various stressors (resilience) brought about by climate change, adapt to these changing circumstances and recover from extreme climatic events.

Recent case studies have underscored the importance of examining social, institutional and cultural dimensions when assessing vulnerability. An NCCARF case study, Community Based Adaptation to Climate Change: The Arabana (Nursey-Bray et al. 2013), explores the multiple social and economic factors impinging on Indigenous vulnerability to climate change impacts. Alberini et al. (2006) show how socioeconomic status is linked closely to health vulnerability, as well as to the associated concepts of resilience and adaptive capacity. Their study found that unequal income distribution, access to information and universal healthcare influence an individual's ability to adapt to climate change. In other words, enhanced adaptive capacity was associated with higher levels of income, social and institutional support and equitable access to a health care system.

Another important facet of social vulnerability is a community's resilience to climate change impacts. The resilience of a community is defined as its degree of robustness or ability to absorb and adapt to climate impacts (Folke 2006). Resilience is a key component of social vulnerability, chiefly because it acknowledges that communities have a knowledge base and social resources that they use to formulate policies to build on existing community strengths and foster further adaptation. For example, resilience can manifest through the sharing of cultural knowledge; older generations can equip younger people with experiential knowledge, which can be to new circumstances requiring adaptation. Case studies (e.g. Berkes and Jolly 2002; Young and Lipton 2006) have also demonstrated how strong social networks (social capital) can be deployed to cope with change. The Australian Red Cross (2012) has also underscored the fundamental role of social capital resources in enhanced disaster resilience and the importance of creating and nurturing civic life with a view to enhancing resilience. Having good networks is fundamental to being resilient.

Case study: Maningrida

Adapted from Altman and Jordan 2009.

Maningrida (pop. 2292) is an Aboriginal coastal community located on the estuary of the Liverpool River, on the north central Arnhem Land coast, approximately 500 km east of Darwin. The Kunibídji people are the traditional landowners of this country. Aboriginal residents of both the township and outstations have remained closely connected with their traditional land, languages, customs and beliefs. Over 50 Aboriginal languages are spoken in the region, and almost all Aboriginal people speak an Aboriginal language at home.

Projected climate change impacts

Maningrida is exposed to a range of climate change impacts. These include sea-level rise, storm surges, and salt water intrusion that will adversely impact the community in the future, as well as threats to a number of freshwater plants and animal species intrinsic to Maningrida's customary economy and traditional way of life. The risk of salt water intrusion to the freshwater-dependent pandanus plant – a key material in many of the products sold by the Maningrida Arts and Culture Centre – is of particular concern to the community, which relies heavily on its arts industry. Additionally, Maningrida is highly vulnerable to tropical cyclones. In 2006, Tropical Cyclone Monica damaged 75 per cent of houses. Projected increases in the intensity of cyclones attributed to climate change will most likely cause further serious damage to housing, infrastructure and the terrestrial and aquatic environments (Figure 1). Indirect impacts are expected to inflate the cost of goods due to increased transport costs due to infrastructure damage.

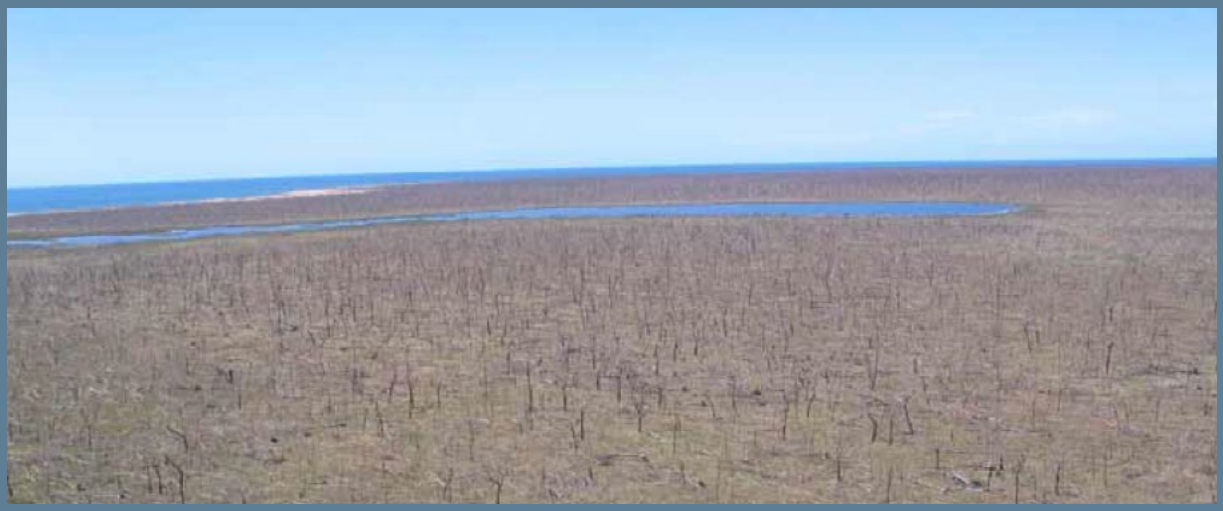

Figure 1: Defoliation: It is thought that wind gusts reached up to 360 km/h at Junction Bay. Source: © Commonwealth of Australia. Credit: Bill Milne, Bureau of Meteorology, 2008.

As in much of the tropical north, climate in the Maningrida region is hot and humid, and even a small increase in average temperature would have a significant adverse effect on human health and comfort as well as on flora, fauna and marine species. Moreover, the threat of sea-level rise and storm surges associated with tropical cyclones may result in the need for relocation.

Adaptation and resilience

For millennia, Indigenous Australians have adapted to their changing environment, and the Maningrida community's response to and recovery from Tropical Cyclone Monica in 2006 – hinging on their ability to endure extreme hardship – is a positive sign of possible adaption to future impacts from climate change. However, although Indigenous communities possess a wealth of local knowledge and demonstrated resilience to historical climate shocks, future weather and climate perturbations associated with climate change will be unprecedented, necessitating new ways of managing these risks and adapting to new impositions.

The Maningrida case study illuminates the potential interdependent and fluid dimensions of vulnerability and resilience in the coastal zone and the complexity inherent in risk assessment and planning under different climate change scenarios. What can be drawn from this study is that local social and economic factors need to be understood alongside projected physical risks – e.g. sea-level rise and tropical cyclones – and that vulnerability research should cut across local, regional and national scales (Adger 2006).

What is more, contemporary resilience indicators, such as demonstrated recovery after Cyclone Monica, for the Maningrida community might be more significant in the coastal zone than traditional socioeconomic vulnerability indicators, such as income and housing status. However, although people in Maningrida can draw on local knowledge and cultural capital, their geographic isolation and cultural and economic dependence on the local ecology ultimately heighten their risk from environmental modifications arising from climate change. The risk of relocation and disconnection from country because of inundation would also be a very serious outcome.

Key risks for vulnerable coastal communities

Disruption to community service organisations

The Australian Council of Social Service has been very active in exploring how Community Service Organisations (CSOs) will be affected by climate change (Mallon et al. 2013). CSOs support people experiencing both short- and long-term disadvantage to manage everyday adversity, to act in times of crisis and to develop both individual and structural solutions to entrenched disadvantage. Indeed, the critical and increasingly recognised role CSOs play in helping communities respond to and recover from extreme weather events suggests they are an important part of the social infrastructure that communities will turn to for assistance to cope with and adapt to climate change.

As the impacts from climate change become more severe, CSOs will act as society's shock absorbers for disadvantaged people facing the physical and social consequences of climate change in the coastal zone. However, research (Mallon et al. 2013) assessing the Australian community service sector's vulnerability to climate change and its adaptive capacity has identified key gaps in the sector's preparedness. The resilience of CSOs requires strengthening, to ensure they are able to support communities when needed most.

The community sector has the relationships, expertise and trust necessary to build the resilience of people at most risk from climate change. However, if the services they provide fail in response to climate change, research suggests there will be serious consequences for the people and communities they support (King 2014; Mallon et al. 2013). As such, it is vital that up-to-date, relevant and accessible research is available and has translational impact, informing collaborative decision-making processes at all levels.

Risk to the residential built environment and basic services

Inundation, erosion and coastal storms pose significant risk to the built environment and basic services in the coastal zone. Risk can be exacerbated by lack of adaptive capacity and resilience in socially vulnerable communities. Coastal communities outside of major cities generally have the highest rates of families that receive income support benefits, the highest proportion of low-income families and the highest median age and aged-dependency (Berwick 2007). This vulnerability is further magnified in low-elevation and remote areas, such as island communities that already experience inundation from king tides. In particular, research on adaptive capacity and climate impacts in remote and poorly resourced coastal Indigenous communities shows how the impacts will degrade living conditions and imperil basic services – such as water, transport, communications and electricity supply – putting people at immediate risk of disruption and potentially physical danger (Green et al. 2010). Disruptions to these services will most likely have deleterious effects on sanitary and public health conditions and may require short-term or permanent relocation of community members.

Although scant Australian research has addressed social vulnerability in the coastal zone, communities with socioeconomic constraints are more likely to reside in substandard housing, which provides less protection from tropical storms and flash flooding associated with storm surges.

Lower-income groups pushed out of capital cities by increasingly unaffordable housing can move into some coastal areas (Gurran et al. 2006). Research has demonstrated (e.g. Instone et al. 2013) that low-income rental tenants in particular have low adaptive capacity, mainly because of the low quality and short supply of housing stock and tenants' limited ability to retrofit their houses. Another risk is that renters new to an area have less knowledge of local hazards such as flood or bushfire zones. People in small coastal settlements may also have limited access to health care and insurance and may be cut off in emergencies.

The historical migration of 'sea change' retirees to regional and peri-metropolitan coastal destinations has been a major driver of coastal population growth and of the high median age in these areas. As the aging process is associated with physiological decline, immobility and greater risk of chronic disease, coastal populations with higher median age are more vulnerable to direct physical impacts of climate change, such as heatwaves, high winds, storms and coastal flooding, and secondary impacts, such as power failures and major disruptions to communication, infrastructure and health and transport services.

Risk to health and safety in the coastal zone

Climate change will adversely affect population health in manifold ways, endangering the lives and wellbeing of billions of people through increased heat stress, floods, frequency of intense storms, under-nutrition, spread of disease vectors and mental ill health (Costello et al. 2009; McMichael et al. 2006; Watts et al. 2015). In particular, extreme heat is currently posing and will continue to pose health risks to individuals in the coastal zone, especially the elderly and chronically ill (Loughnan et al. 2013). Although knowledge of how climate change will affect human health in the coastal zone is seriously lacking, research suggests that each region will be challenged with a dynamic and place-based suite of physical climate impacts, interacting with the social determinants of human health (i.e. low income, social conditions, poverty) (Loughnan et al. 2013; Marmot and Wilkinson 2005).

Research has repeatedly demonstrated how poverty and social exclusion are inextricably linked to health inequality, and that climate change will exacerbate health disparities already manifest in specific geographic communities and within socioeconomic strata (Marmot 2005). Disaster case studies are strikingly illustrative of how climate change impacts will discriminate between those with robust health and people burdened with poverty and chronic health conditions (e.g. Ahern et al. 2005; Eisenman et al. 2007; Riad et al. 1999). More specifically, flooding events associated with climate change will most likely increase the burden of disease, especially for individuals with pre-existing health and mental health conditions (Ahern et al. 2005; Alderman et al. 2012). Flooding has been linked with disease outbreaks such as hepatitis E, gastrointestinal disease and leptospirosis, and there is evidence that mental disorders such as depression and anxiety may also be exacerbated (Fernandez et al. 2015).

Homelessness is also a significant vulnerability factor for climate change. Because the homeless do not have access to many physical and environmental resources, they are extremely exposed to the health impacts of flooding and disasters associated with a changing climate (Every 2015; Fothergill and Peek 2004).

Research has also shown (e.g. Barnett et al. 2013) that low-income families living in low-quality and community housing are highly vulnerable to extreme heat, chiefly because this housing stock is not insulated sufficiently. Compared to households on medium to high incomes, key risk factors for heat-related health issues were twice as prevalent in low-income households,

undermining resilience and exacerbating vulnerability. Low-income households are further exposed to heat-related health risks because they are associated with suburbs with the highest land surface temperatures. Moreover, and most obviously, flooding in the coastal zone endangers health through drowning and physical injuries (Alderman et al. 2012).

Conclusion and implications for policy

Climate change and, in particular, rising sea levels and more intense storms will force significant changes to coastal zones in forthcoming years. Undoubtedly, coastal communities with high exposure to these impacts, combined with social vulnerability factors such as low socioeconomic status and pre-existing health and mental health issues, will be most susceptible. Previous research on social vulnerability to climate change clearly states that current socioeconomic disparities in communities will be further magnified by future climate impacts. However, little research has addressed the discrete needs of those experiencing poverty and inequality in Australia's coastal zones, which will have serious negative implications for efforts to reduce the vulnerability of disadvantaged communities.

To mitigate risk posed by climate change to disadvantaged communities, well-funded, responsive and nuanced planning for adaptation to multiple physical, economic and social impacts in coastal zones is required. Underpinning this planning requires research that takes a holistic view of vulnerability, which appreciates the dynamic and bi-directional interactions between exposure to physical impacts and pre-existing social, health and economic factors, which combine to contribute to communities' degree of vulnerability and resilience.

To reduce vulnerability, policy will need to address the causes of disadvantage and inequality currently manifest in Australian society. For example, adaptation to warmer and more volatile weather in coastal regions will require government to improve the integrity of poorly designed or inefficiently insulated housing stock for low-income households and public housing tenants.

Additionally, better communication of climate risks and adaption options for those experiencing poverty and inequality may also build resilience in people more vulnerable to climate risks.

The Community Engagement Framework (Australian Emergency Management Institute 2013), a key component of National Strategy for Disaster Resilience, characterises disaster resilience as a shared responsibility for governments, communities and individuals alike. This strategy aims to empower communities to take part-responsibility for developing their own adaptation and resilience capacity in the context of disasters. The capacity of socially vulnerable communities in the coastal zone to actively enhance their resilience is not equivalent to that of communities with greater access to resources and social capital. This will mean that ensuring CSOs are well adapted so that they can attend to the needs of the vulnerable before, during and after extreme events, will be especially important. Although various national and state policies and guidelines recognise the additional needs of vulnerable groups, limited action has been enacted that addresses this issue.

Support for vulnerable communities before, during and after disasters and extreme climatic events driven by climate change will require immediate adaptation and resilience-building interventions, including improvements to social and built infrastructure, such as reinforced sea walls. In the longer term, however, planning and policy will need to attend to the root causes of social vulnerability – that is, the social, economic and health disparities that undermine resilience and adaptive capacity.

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