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ARTICLES

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Beyond the Hot Debate: Social and Policy Implications of Climate Change in Australia

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ABSTRACT

This paper discusses the social and policy implications of climate change on the world's most arid populated continent. Warmer average temperatures will have real, identifiable impacts on human health, marginalized sectors of the population, and the sustainability of rural and coastal communities in Australia. By analysing indicators of environmental health and social welfare we can identify emerging threats posed by a warmer climate. Policy-makers will need to devise a suite of social policy and technologically-driven mitigation programmes in order to safeguard citizens against the most complex and far-reaching environmental and policy problem of the 21st century. Furthermore, the Australian federal government has a valuable opportunity to effect positive change in the Asia-Pacific region through its leadership in this policy area and funding programmes that promote the establishment of low-emission economies in developing nations.

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Introduction: The Need for Innovative Policy

For the past two years, the Australian public has been subjected to a great deal of discussion regarding global climate change and legislation regarding a trading scheme for carbon emissions that might change Australian society's intensive use of energy. For all the contentious debate regarding the pricing of carbon credits, the potential impact on the nation's extractive industries, and the Liberal-National party coalition schism that emerged during negotiations surrounding this legislation, remarkably little progress has been made toward enacting public policies that prepare the nation for the effects of a warmer, drier climate. Some commentators have also suggested that the Labor government's failure to pass the carbon emissions trading scheme through the Senate was a crucial policy failure that damaged Prime Minister Kevin Rudd's reputation and precipitated the events that led to his replacement by Julia Gillard in June 2010.

Little has been done to fill the policy vacuum and mitigate the effects of global warming on Australian society. While technological advances in the energy production, transportation and agricultural sectors of the economy are essential if the nation is to curb its carbon output, there is also a pressing need for a suite of innovative social policy initiatives that would safeguard the most vulnerable components of the population from the spectre of climate change. This paper will discuss the effects of climate change that have been identified and witnessed by Australia's scientific community, and highlight key areas where forward-thinking policies could effectively mitigate the harmful effects of a changing climate on people and the economy. The most vulnerable groups stand to suffer disproportionate hardship in a warming world, and there is a need for policymakers to take action. Alongside the structural and technological advancements envisioned for a low-carbon economy, such public policy measures would work toward the long-term sustainability of Australian society.

Global Discord and the Looming Threat

The disheartening outcome of the Copenhagen Climate Change conference in December 2009 seems to have diminished the positive effect of earlier global initiatives such as the Bali Action Plan (2007) and quashed hopes of a concerted global effort to curb carbon emissions. The Bali agreement attempted to lay the groundwork for increasing international engagement and voiced the hope that the global community would begin to implement policies that arrested the growth of carbon dioxide emissions and addressed some of the social implications of a warmer global climate (Mittelstaedt 2007). It was hoped that at the end of 2009, the Bali Action Plan would be superseded by a new, stronger climate change agreement where nations would pledge to reduce carbon emissions to levels between 25-45% of the 1990 levels by 2020 (Anderson 2008). This type of solid agreement never emerged in Copenhagen, in part because the concerted efforts of 'climate change sceptics' derailed any serious discussions that could produce a comprehensive agreement on emission reductions (Climate Group 2010).

In Australia, such sceptics have mounted continuous attacks on the scholarly community, the professional integrity of scientific investigators, and challenged the validity of climate science. Comments made by Senator Nick Minchin, an esteemed member of the Australian Liberal Party, are indicative of the unsubstantiated, blanket statements favoured by these individuals. On the ABC's Four Corners programme titled 'Malcolm and the Malcontents' televised on 9 November 2009, he struck out at all those concerned by the threat of climate change and blamed them for indoctrinating a whole generation of young Australians. He argued that 'For the extreme left it provides the opportunity to do what they've always wanted to do, to sort of de-industrialise the western world. You know the collapse of communism was a disaster for the left, and ... really they embraced environmentalism as their new religion' (ABC 2009). Minchin's vocal leadership of a group of senators hostile to new environmental regulations proved sufficient to stifle debate and the advancement of climate change mitigation policies through the Australian Senate.

These 'climate change sceptics' choose to ignore the scientific data pointing to threats to land, life and economy posed by global warming. Rising sea level is one such threat. Sea levels are rising due to increased in-flow of freshwater from melting glaciers and polar icecaps, while the thermal expansion of the oceans during an era of higher temperatures will add to the problem. Australia's coastline stretches for 36,735 kilometers and all of the nation's major centers of population and economic activity are found in the coastal zone. While south-eastern Australia's alpine skiing industry – and the 12,000 full-time jobs associated with this sector – is expected to suffer in an era of warmer temperatures, the threat to coastal communities will be exponentially higher (Viner and Agnew 1999). For example, as one of the leading tourism destinations in the Asia-Pacific region, the city of Cairns on the north Queensland coast is particularly vulnerable to the expected outcomes of a warming climate. Its economic dependence on nature-based tourism related to the nearby Great Barrier Reef and rainforest habitats of the Daintree will suffer greatly when coral reefs are inundated faster than their natural growth rate and shifting precipitation belts affect forest species and heighten the bushfire threat. Furthermore, its coastal setting leaves Cairns 'threatened by the ravages of tropical cyclone storm surges', a problem magnified by the projected rise in sea level (Viner

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and Agnew 1999). While additional studies using regional climate modelling techniques reiterated that global warming would increase tropical cyclone intensity near Australia (Walsh and Ryan 2000), this theory was confirmed when Cyclone Larry struck the Innisfail area of northern Queensland in March 2006 and caused AU$1.5 billion in damages, and subsequently Cyclone Yasi devastated the Cairns region in February 2011 (Reuters 2011).

Policymakers at the local, state and federal level of government need to be prepared for the new set of problems faced by coastal communities. Foremost, it will be imperative that communities adjust their approach to the lucrative business of beachfront residential and commercial development. While in most cases beach reserves and foreshore parklands may be able to accommodate the 0.20 meter (8 inches) sea level rise expected by 2050, it is the magnified effect of extreme weather events – such as cyclones, storm surges and king tides – that have a greater potential to inflict real damage on coastal environments (IPCC 2001). One study that modelled the effect of sea level rise on the beach suburbs of northern Sydney expressed serious concern that 'more than two-thirds of the world's sandy coastlines have retreated during the past few decades' (Hennecke et al 2004). This is a clear sign that storm events have increased in strength, frequency and destructive capacity. More importantly, their investigation found that the accepted 50-year sea level rise scenario, combined with a significant storm event, could cost AU$245 million in lost land and property value along Collaroy-Narrabeen Beach (Hennecke et al 2004). Policymakers at all levels of government need to take notice of these looming threats to seaside property. At the very least, urban planning regulations and their modes of implementation will need to be reassessed by the state and shire levels of government to ensure that homes and businesses are not flooded or swept away as the shoreline retreats inland.

As early as 1995, the Environmental Protection Agency in the United States weighed potential policy responses to sea-level rise and concluded that "Where the coastal processes and land development are on a collision course, the preferable option will be for the land development to move back from the shoreline" (US EPA 1995). Having initiated a full review of the State Coastal Planning Policy in 2010, the state of Western Australia adopted planning regulations that acknowledged an expected increase in sea level of 0.9 meters (35 inches) by 2110 (WA Department of Planning 2010). For new development on the sandy coast, the total setback was increased from 100 meters (328 feet) to 150 meters (492 feet). In the announcement of the new policy, Planning Minister John Day noted that the "key objective of the policy is to create a coastal foreshore reserve that can accommodate coastal processes – such as sea level change, erosion, accretion and severe storms across a 100-year planning time frame" (Urbanalyst 2010).

This change signals a trend toward a more conservative approach to development approval in Australia. There is increasing awareness that irresponsible patterns of development and the absence of precautionary building regulations could leave local councils, and even state governments, open to future negligence claims if property damage is incurred.

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Climate Change and Population Health

The efforts of 'climate change sceptics' to block mitigation programmes may also harm the long-term well-being of Australians. A hotter, drier climate will be detrimental to the health of many people. In their latest update on climate change in 2007, the Inter-Governmental Panel on Climate Change (IPCC) declared that warmer temperatures will visibly change the geographical patterns of disease, increase the potential harm stemming from water-borne contagions such as diarrhoeal disease, dengue fever, and raise the number of heat-related deaths around the globe (IPCC 2007). Malaria is already responsible for an estimated 25% of deaths worldwide in children aged 0-4 years old, and while the intensity of malarial infection may decline in some areas due to drier conditions, it is expected to broaden its geographical range overall (Patz et al 2007). The world's poor, already subject to greater health risks, will bear the brunt of these negative impacts and suffer additional hardships as more frequent extreme weather events force marginal communities to migrate in distress. Lack of access to quality medical care and vital medicines exacerbates the vulnerability of this group. A study conducted by Sachs and Malaney in 2002 confirmed that disadvantaged populations can expect a heightened risk of contracting tropical disease in high-risk areas of the world. In examining the connection between poverty and the prevalence of malaria infection in sub-Saharan Africa, their study also showed that malaria-infected areas suffered from lower economic output as indicated through lower GDP figures (Sachs and Malaney 2002). In late 2010, a renewed effort to tackle seventeen neglected tropical diseases was launched by the World Health Organization (WHO). To address the lack of resources that has been an ever-present problem for health initiatives attempting to reach large numbers of very poor people, the WHO has partnered with pharmaceutical industry companies such as Novartis, Sanofi-Aventis, Bayer and Novartis to secure the long-term drug donations needed for disease eradication programmes (WHO 2010).

In Australia, a warmer climate will heighten the risk posed by the transport of airborne microbes, and enhance the geographical range of dengue fever, Ross River fever and Murray Valley encephalitis. The population centers of the tropical north and coastal Queensland are most vulnerable to this process and it is essential that local health services be prepared to handle new cases of infection. The mosquito-borne diseases are strongly influenced by variations in climatic conditions, with warmer waters encouraging the southward expansion of transmitting insects. A 2003 risk assessment undertaken by the federal government examined the potential spread of dengue fever under medium and high greenhouse gas emission scenarios in order to identify areas with new disease risks by the target date of 2050. While the range of the disease was limited to areas north of Cairns in Queensland, Darwin and Arnhem Land in the Northern Territory, and southwest toward Broome in Western Australia, the future climate scenario generated a much expanded range of disease risk. Under a high emissions scenario, in was expected that dengue fever cases could appear in Queensland's coastal cities of Cairns, Townsville, Mackay and Rockhampton, push inland in the Northern Territory to the town of Katherine, and stretch along the coast of Western Australia as far south as Carnarvon (McMichael and Woodruff 2003). This does not bode well for the future health of residents in northern Australia. For while the treatments avail-

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able for malaria are effective, fast-acting and can kill the infectious parasite, there are not yet any treatments available that would reduce the much longer period of dengue infection. A further difficulty is posed by the nature of the mosquitoes that transport these diseases. The malaria mosquito does not breed in an urban environment and is predominantly active at night. In contrast, the dengue mosquito is able to breed in the urban environment and will be active in mornings and evenings. Hence, the threat posed by an expansion in the range of dengue fever ought to be a primary concern for the health services operating in Queensland, Western Australia and the Northern Territory.

Sadly, it appears that the disease range has spread more quickly than models had predicted. On 5 January 2009, an ABC news report confirmed fears that the dengue fever mosquito had shifted southward along the Queensland coast. During the preceding month, public health authorities had been trying to contain a dengue outbreak with more than fifty cases in Cairns, when two additional cases were reported further south in Townsville. By the end of March 2009, a dengue fever epidemic had been declared in northern Australia after it was discovered that four serotypes of the virus were circulating simultaneously in the tourist town of Cairns and one person had died from dengue haemorrhagic fever (McCredie 2009). In response to this incident, the Tropical Population Health Unit urged residents to tip out all stagnant water on their properties, use insect repellent and be mindful that it is 'an indoor day biting mosquito' that propagates haemorrhagic dengue (ABC 2009b). Medical experts working to control this disease expect dengue to become a more serious problem in Queensland over the coming years as rainfall patterns begin to show significant change. Counter-intuitively, less rainfall in Queensland was expected to create a greater threat from the mosquito population. In their words: 'As rainfall drops, more people tend to store water more around their houses and it's those containers where the mosquitoes that transmit dengue really like to live and breed' (ABC 2009a). Since the major outbreak of dengue fever in the Cairns area over the summer of 2008-2009, a concerted effort at the local shire and town council levels has made great strides in addressing this public health issue. In the years 2010-2011, the number of reported dengue fever cases in Queensland hovered below 10% of that reported during the Cairns outbreak (Queensland Health 2011).

Remote indigenous communities in northern Australia are especially vulnerable to health impacts because their small scale and the vast distances between locales often mean that public health services are more limited than those found in cities. As part of the 2008 Garnaut Climate Change Review, a report by Donna Green examined this issue and found that 'the inadequate and often culturally inappropriate health facilities and education infrastructure' hampers efforts to promote good health and education in this region. Her study concluded that indigenous communities 'are likely to be disproportionately disadvantaged by climate change', a situation exacerbated by the poor state of existing infrastructure and high birth rates in some communities (Green 2008). Scientific projections that 'the central and western deserts will have the greatest average warming in Australia', with temperatures raised by up to 6OC (10.8OF) by the year 2070 and an increase in the number of hot spells, paints a dire scenario for these regions. The 0.50 meter (19.6 inch) rise in sea level expected over the next century will affect the reliability

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of traditional food harvesting activities, add to worries about potential flooding on low-lying coasts, accelerate salt inundation of freshwater aquifers, and increase exposure to infectious enteric diseases and melioidosis. Regions like Arnhem Land, home to a number of communities that are currently experiencing high population growth, will be particularly hard hit by climate change if no anticipatory adaptation programmes are implemented (Green 2006, Green 2008).

The psychological impact of the climate change phenomenon will be an additional concern in Australia's affected regions, as new environmental patterns and processes replace dependable natural rhythms. Communities with a strong spiritual attachment and economic dependence on land-based production will experience sustained mental stress and disruption of livelihoods. Indigenous communities may experience heightened emotional anxiety as traditional lands begin to alter in character or are inundated under a rising sea, and rural communities based on agricultural production may face complete ruin as the temperature rises and precipitation belts shift. The powerful traditions and sense of connection Australian Aborigines have to their ancestral territories will magnify the mental anxiety and may potentially lead to further problems within these communities. Donna Green has argued that 'If community-owned country becomes 'sick' through environmental degradation, impacts of climate extremes, or inability of the traditional owners to fulfill cultural obligations through ongoing management and habitation; the people of that land will feel this 'sickness' themselves' (Green 2008). Observed shifts in weather and wildlife migration patterns have already caused some consternation and distress. In the Snowy Mountains of south-eastern Australia, long-term observations of bird migrations showed that migratory birds were arriving several weeks earlier in the 1980s and 1990s than they had been in the 1970s (IPCC 2007a, Green and Pickering 2002). It is believed that higher minimum temperatures enable birds to migrate earlier in their annual cycle.

The warming and drying of Australia's most productive farmlands will cause a great deal of stress in rural areas as crops fail and conditions dictate that some will need to be retired from agricultural production. Less rain, more evaporation, greater heat stress on plants and less water available for irrigation will hurt agricultural yields. And while farming is already a stressful occupation, droughts and extreme weather events will be the sort of adversities that farmers can expect more of in the coming decades. Droughts cause financial stress through the loss of crop income, the depreciation of capital stock when capital is idle, while underemployment often results in the loss of psychological well-being. Springtime droughts are particularly damaging to both crops and communities, and researchers have found that they are 'associated with a large decline in life satisfaction for rural communities' (Carroll et al 2009). While rural Australians often pride themselves on their resilience, regions hit with adversity often witness as rise in mental health problems and a concomitant rise in the number of farm suicides (Anderson 2008a).

A study examining statistical data from the 2001 census found a clear link between stresses associated with farming and suicide rates. Examining data from South Australia, researchers found that the rate of suicides on farms in that state was 'significantly higher than the overall rate of suicide' (Miller and Burns 2008). In another case study, data collected during the New South Wales drought of 2006 showed that a 'decrease in precipitation of about 300mm has been associated with

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an approximately eight percent increase in the long-term mean suicide rate (Berry et al 2008). In a drying and warming climate, access to mental health assessment and treatment services in rural areas will need to improve if lives are to be saved and the enormous burden placed on sufferers and their carers is to be managed. A warmer and drier climate will require that some districts need to cease agricultural production and close down the lucrative businesses that support the farm sector. Similarly, in the aftermath of the 2009 Victorian bushfires there appears little doubt that the fire hazard has been 'exacerbated by climate change' (Griffiths 2009). In this case, governments are now revising their approach to the bushfire threat and new fire evacuation protocols, but a broader reassessment of rural settlement patterns may be required as climate change alters the productivity of the land and character of fire-prone, eucalyptus forests.

Beyond the urban-rural dichotomy in the distribution of negative impacts from global warming, the adverse effects of climate change will also be felt more strongly by those living on the wrong side of the Australian class divide. Major reports commissioned by the Australian Conservation Foundation and the Friends of the Earth have highlighted serious concerns about how lower income groups will fare in an era of global warming (ACF 2007; Friends of the Earth International 2007). With higher ambient temperatures, more frequent hot spells and anticipated higher costs of living (due to increased food, energy and housing costs), is it clear that lower income Australians are in the worst position to face the economic repercussions of climate change. This represents a gross inequity given that low income groups have historically contributed the least to carbon dioxide emissions. Furthermore, they are least able to pay for the housing modifications and heightened energy expenses that will face most citizens over the next generation, and the rural poor may face the additional stress of employment loss as agricultural production suffers in some districts. In 2009, the Labor government's home insulation rebate scheme was one attempt to address these issues in the midst of the global financial crisis. However, this programme's lack of oversight and failure to achieve major policy targets showed that future initiatives in this area need to include clear quality assurance mechanisms and a strong monitoring regime.

The health of elderly Australians will also be directly threatened by the higher temperatures foreseen in the future. Given that the expansion of this demographic group is following the pattern experienced in other advanced economies, we can expect that the well-being of elderly Australians will gain greater prominence as a major issue over the next few years. According to projections released by the Australian Bureau of Statistics, 13.1 percent of Australians were aged 65 years and over in 2005, and this figure is expected to rise to 25.7 percent by the year 2050 (ABS 2006). A growing body of literature on this subject suggests that there will be increased mortality due to severe heat waves. In Australia, it is estimated that around 1,100 people aged over 65 years die each year due to physical stress from high temperatures (Woodruff et al 2006). A 2006 report jointly commissioned by the Australian Conservation Foundation and the Australian Medical Association has used a comparative model to estimate the health impacts of increased temperatures on the elderly. The first modelling scenario assumed that the Australian population in 2100 would have experienced zero growth. Secondly, it compares two climate policies that could be adopted by the Government throughout the

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21st century. If a regime of low emissions is pursued, '…the heat-related mortality [in the 65+ age group] could be between 1,700 and 1,900 deaths each year… under [high emissions] heat related deaths could be between 2,600 and 3,200 per year.' A second model used the same comparative methods, but assumed that the Australian population has increased by 2100. Depending on the size of Australia's population increase, it is entirely possible that the number of citizens aged 65 and over could be two or five times greater in 2100 than it is today. If a regime of low emissions were pursued, heat-related mortality in the elderly could be between 4,200 and 8,000 deaths each year, under high emissions this could be between 8,000-15,000 deaths each year (Woodruff et al 2006).

We are already beginning to witness the devastating effect of extreme heat on elderly citizens. Sudden, heat-related deaths reached a crisis level in South Australia during the heat wave of January 2009. In Adelaide, ambulance officers reported as many as 24 deaths in a single day, as temperature rose so high that the suburban railroads warped and buckled in the searing heat (ABC 2009d). What is most saddening about the deaths precipitated by the Adelaide heat wave was that they were largely preventable. Given that the nation's population is highly centralized within a handful of major cities, it is incumbent on state and city officials to respond rapidly to the health threat posed by extreme heat. Rather than implementing expensive technological and infrastructural building programmes to heat-proof the housing stock, better co-ordination of social work and community outreach programmes, alongside the designation of temporary cooling centres could prove to be a simple and effective response to these crises. As many elderly people often live alone, it is crucial that social welfare programmes maintain regular communication with them during extreme weather events and provide free transport to centres where people could seek respite from the incessant heat. It is vital that governments provide safe options for city residents living in dwelling that are not equipped to handle extreme heat episodes. Without strong measures to mitigate the effects of climate change in Australia it is almost certain there will be an increased heat-related mortality trend amongst the elderly population throughout the 21st century.

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Signs of Movement in Australia and Abroad

Before the demise of the carbon emissions trading scheme, there were many encouraging signs that Australia was on the cusp of a transformative era in which economic production and the lifestyles of citizens would begin to reflect a much-needed shift toward a low-carbon emissions economy. Climate change experts such as Professor Warwick McKibbin called for drastic cuts in carbon emissions and urged that all revenue from the sale of carbon credits 'be focused on emissions reduction' (ABC 2009c). Such a position was echoed by the Senate-based Green Party. Globally, business leaders have begun to voice strong support for a variety of 'green' initiatives. This move responds to sentiments expressed by their clientele and, more importantly, recognises the significant savings on operational costs that could be won by adopting more sustainable practices. Wal-Mart, the world's largest retailer, has pushed its 200 largest Chinese suppliers to become 20 percent more energy efficient by 2012 and trimmed product packaging that in turn saved the company US$3.5 million in transportation costs over a single year (Kirby 2008).

Conscientious, less wasteful production often yields greater profits, and so for the private sector the meeting of social and environmental standards has proven to be a worthwhile endeavour. Given this trend, we might do better to think of the defeat of the emissions trading scheme as a minor delay on the road to sustainable change in the Australian economic and society.

While Australian politicians struggle with the issue of climate change and how to mitigate its damaging effects on society, other nations around the world are moving forward to fill this policy vacuum. The European Union continues to display leadership in the global drive toward lessening the carbon intensity of wealth creation, and its efforts in the area of fuel and energy efficiency have set a high standard for the rest of the world to follow. Following in their footsteps, the United States recently announced fuel efficiency regulations that bring that nation a step closer to the European norm, and President Obama's commitment to controlling carbon emissions at the Copenhagen conference in December 2009 could be seen a small, tentative step forward in the global discussion. In June 2009, the US House of Representative passed the Clean Energy and Security Act that would put the US economy under a 'cap and trade' system, reduce greenhouse gas emissions by 17 percent (from 2005 levels) by 2020, and wean the American economy off oil imports (ABC 2009e). And although China remains reluctant to commit to absolute cuts in carbon dioxide emissions for fear of hampering the meteoric rise of its economy, rising energy and fuel costs for its manufacturing sector have generated incentives for reducing the carbon intensity of its economy.

In the world's advanced economies, policy units are beginning to incorporate the social implications of climate change into their analyses. The United Kingdom was one of the first global powers to realise that social policy measures must play an important role in its national response to climate change. A 2007 national assessment identified that the development of future social policies related to climate change will require greater research into the vulnerability of individuals and groups, assessments of public education and adaptation schemes, and better estimates of the impact of global warming on human health (Owen 2007). Also in 2007, a report by the US Congressional Research Service flagged the need to develop appropriate administrative linkages and communication channels that would enable researchers to reach decision-makers and facilitate action to mitigate the impact of global warming. In reassessing research priorities and encouraging the development of cooperative mechanisms for sharing insights, the US government appears more receptive than ever to calls for constructive change (Leggett 2007, 45).

Meanwhile, in Canada the Pembina Institute – a policy research center focused on environmental issues – has presented the federal government with a set of well-articulated greenhouse gas emission reduction policies which includes policy evaluation criteria that distribute fairly the burden of cost for structural adjustment to major polluters. Important principles, such as 'ability to pay and historical responsibility for pollution' underpin their proposals and ensure that the poor and marginalised sectors of society do not bear the cost for societal transformation (Demerse and Bramley 2008, 6). The Pembina Institute has argued that social responsibility can be assured within a distinctly free-market system. Given that 'approximately 50% of Canadian emissions come from heavy industry, a portion

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of the economy that has shown itself responsive to price signals, carbon pricing appears to be a crucial piece of the puzzle in cutting Canada's emissions' (Demerse and Bramley 2008, 1). In the absence of real leadership on this issue from Canada's ruling Conservative party, more progressive provinces such as British Columbia have taken it upon themselves to enforce emissions cuts. Accordingly, in 2007 British Columbia's Liberal government embarked on a programme that would see the province's carbon dioxide emissions cut 33% by the year 2020 (Bailie and Horne 2007, 1). This action proves that, in the absence of agreement at the global level or even within a federated political system, there is no need for positive action to be delayed.

Despite the poor legislative record to date, the Australian public service appears to now have the capacity to act on this issue in a concerted manner. Established shortly after Labor's November 2007 election victory, the Department of Climate Change has acknowledged that 'As one of the hottest and driest continents on earth, Australia will be one of the nations hardest and fastest hit by climate change if we don't act now' and begun to establish programmes that place the cost of change on the wealthier component of society (AG 2008a). For example, the Labor government's investment in the solar and renewable energy sectors, and in particular the AU$7500 rebate available to homeowners for the installation of solar panels, included a means testing mechanism that was intended to make this basic energy infrastructure accessible to less wealthy households (ABC 2008a). Furthermore, as a subsidy for installing a solar energy system, homeowners selling power back into the grid would receive 'credit worth five times the value of the energy produced'(ABC 2008b). In this way, the Australian federal government ensured that a sector of society that would have been unlikely to participate in the promotion of renewable energy was now a central proponent and beneficiary of the technology.

Australia's Department of Climate Change has also supported joint initiatives with developing nations in the Asia-Pacific region. Having declared its readiness to play a 'full and fair part' in an effective global solution to climate change, the government funded an AU$200 million International Forest Carbon Initiative aimed at reducing emissions from deforestation and forest degradation in developing countries (AG 2008b). The collaborative Forest Carbon Partnerships with Papua New Guinea (PNG) and Indonesia has safeguarded the future of forests in Kalimantan (Indonesia) and the Papuan Highlands, and funded joint research and training programmes with the Centre for International Forestry Research in Indonesia. The Australians have also pumped over AU$15 million into programmes that 'assist countries in the Asia-Pacific region increase their capacity to manage forests sustainably to reduce deforestation and forest degradation'(AG 2008c). In a November 2008 speech to the Lowy Institute in Sydney, PNG Prime Minister Sir Michael Somare applauded Australia's efforts in promoting sustainable forest management in the Asia-Pacific region. Somare also expressed grave concerns that in PNG 'our very way of life is being destroyed' by global warming and that its disastrous effects could already be seen. He declared that climate change was responsible for 'bleached coral reefs that are starving our fisheries; atoll-based communities that are disappearing under the rising waves; mosquitoes that are moving up mountain ridges and killing children; we find beaches eroded away and suffocated by the

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swelling seas; and mighty trees, once high up on the beach, now drowned, felled and sinking under the surface' (Somare 2008). Clearly, Australia's co-operative programmes with the developing nations of the Asia-Pacific region serve a major need for expertise and enhance the well-being of citizens in these societies. In the coming years, as island nations such as Kiribati and Tuvalu find their populations threatened by a rising ocean it will be incumbent on the Australian government to provide direct assistance to these vulnerable Pacific ethnic groups and develop appropriate work permit and residency visa arrangements that could enable a staged withdrawal from low-lying islands (McAdam and Loughry 2009).

Conclusion: Addressing Climate Change and Persistent Inequalities

The so-called 'climate change debate' that has dominated media reports in Australia for the past three years has yet to generate any concrete programmes for dealing with the disproportionate impact of global warming on the most vulnerable sectors of its population and the residents of its northern and rural areas. Following many months of political manoeuvring, public debate and parliamentary committee work, on 22 August 2011, Australia's Labor government (with key support from the Green Party in the Senate), passed Carbon Farming Initiative legislation that would allow farmers and investors to trade carbon offset credits from farmland and forestry projects (Reuters 2011b). This scheme is intended to be a precursor to a carbon tax scheme that is expected to be passed by parliament in the coming months and take effect in July 2012. Additional legislation for renewable energy production and energy efficiency programmes are expected to follow in short order. However, with a fragile, Labor-led coalition in the House of Representatives and growing public dissatisfaction with a poorly-communicated legislative agenda, it is not clear whether all legislation will be tabled in parliament. Indeed, focusing political discourse on business impacts and carbon price figures has caused many Australians to reconsider the full-scale transformation of their economy and hidden from view the vulnerable components of society that will bear the brunt of climate change impacts in Australia. Furthermore, in delaying the implementation of mitigation programmes Australia has missed a valuable opportunity to show consistent, constructive policy leadership in the Asia-Pacific region.

Developing nations, those that have historically contributed least to global carbon emissions, are also least able to mitigate the harmful impacts of climate change. As the mounting evidence from Papua New Guinea and south Pacific island nations has shown, the rising sea levels that accompany warmer ambient temperatures are already forcing the relocation of fragile coastal communities and will likely result in the full-scale evacuation of inundated islands. The United Nations Development Program (UNDP) has estimated that failure to act quickly will consign the poorest 40 percent of the world population —some 2.6 billion people— to severe environmental disruption, economic instability, and a future of diminished opportunity. It will exacerbate deep inequalities within countries, reinforce disparities in the Asia-Pacific region and ultimately impact on regional security (UNDP 2008). In these countries, gains in welfare satisfaction and family planning programmes could be easily funded through development programmes that redis-

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tribute wealth within the region and would contribute greatly to emissions reductions (Pan 2008). Beyond the hot debate surrounding carbon tax schemes and the trading of offset credits, it is imperative that Australian policy-makers implement a range of policies that protect the nation's most marginalised groups, the economic sustainability of its distant regions, and lessen existing social inequalities.

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ENDNOTES

1. Woodbridge (2004) argued that the key to preserving the natural environment (including addressing the issues of climate change) is to devote the same energy to this purpose that is currently devoted to military expenditures and strategy.

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