

RISING TO THE CHALLENGE: ADDRESSING CLIMATE AND SECURITY IN OUR REGION

CLIMATECOUNCIL.ORG.AU

Thank you for supporting the Climate Council

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

Published by the Climate Council of Australia Limited.

ISBN[.] 978-1-922404-27-5 (print) 978-1-922404-26-8 (digital)

© Climate Council of Australia Ltd 2021

This work is copyright the Climate Council of Australia Ltd. All material contained in this work is copyright the Climate Council of Australia Ltd except where a third party source is indicated.

Climate Council of Australia Ltd copyright material is licensed under the Creative Commons Attribution 3.0 Australia License. To view a copy of this license visit http://creativecommons.org.au.

You are free to copy, communicate and adapt the Climate Council of Australia Ltd copyright material so long as you attribute the Climate Council of Australia Ltd and the authors in the following manner: Rising to the Challenge: Addressing Climate and Security in our Region.

Authors: Cheryl Durrant, Dr Simon Bradshaw and Alix Pearce.



Cover image: (Top) View from HMAS Adelaide arriving in Eden, 5 January 2020. Mike Gordon. Twitter @guggajugs. (Bottom left) Brisbane River flood January 2011 - Aerial view of a residential area in the suburbs of Milton during the great Brisbane flood of 2011. By Brisbane. Shutterstock. (Bottom right) Abaiang atoll, Kiribati. Simon Bradshaw.

This report is printed on 100% recycled paper.



facebook.com/climatecouncil

info@climatecouncil.org.au

twitter.com/climatecouncil

climatecouncil.org.au



Cheryl Durrant Climate Councillor



Dr Simon Bradshaw Acting Head of Research



Alix Pearce Campaigns Director

Contents

Key findings			2	
For	Foreword			
1.	Introduction		6	
2.	Climate change as a driver of insecurity		10	
	2.1	Lessons from history	11	
	2.2	Insights from data	13	
	2.3	Understanding the relationship between security risks and cascading and compounding risks	15	
3.	Climate and security risks in our region		18	
	3.1	Regional overview	19	
	3.2	Scenario 1: Loss of geopolitical influence	23	
	3.3	Scenario 2: Water insecurity and war	25	
4.	Out of step and out of time		28	
5.	Rising to the security challenge		31	
6.	Recommendations		38	
Ref	References			
Im	mage credits			

Key findings

1

Climate change increases the risk of conflict and Australia will not find lasting national security without adequately addressing it.

- Australia faces substantial climate and security risks on its doorstep and without urgent action, climate change will reduce security in our region.
- Failure to rise to the challenge of climate and security is already leading to a loss of geopolitical influence for Australia, particularly in the Pacific.
- Water has long been a contested resource in Asia and climate change is worsening the situation.
 Any conflict over water in our region could have profound consequences for Australia.
- Pacific Island Countries as well as Bangladesh, China, Vietnam, India and Indonesia face significant threats from sea level rise, which is likely to increase displacement and forced migration.

2

The federal government's financial support of the fossil fuel industry is actively undermining Australia's national security.

- > Australia is spending public money in ways that exacerbate climate change, including handing out billions of dollars in fossil fuel subsides.
- Australia failed to use COVID-19 to invest in a renewables-led recovery, spending less than two percent of its economic stimulus money on climate solutions. By comparison, Canada spent 74.5 percent and the UK spent more than 20 percent.



3

Australia has fallen well behind the US, UK, Japan, New Zealand and other peers in analysis of climate and security risks.

- Climate change needs to figure prominently in Australia's security thinking and investment, but this is not yet the case.
- In 2018, a Senate Inquiry called for a national climate and security threat assessment but this has not occurred, and climate change remains on the margins of Australia's defence, foreign affairs and trade strategies.
- Other nations and international organisations are rapidly broadening traditional notions of national security in order to address climate security risks.

4

Australia must act rapidly and decisively on climate change in order to maintain the collective security of our region.

- > To address the root cause of climate-fuelled insecurity, the science is clear that Australia should reduce its emissions by 75% (below 2005 levels) by 2030 and achieve net zero by 2035. As a first step, Australia must at least match the updated commitments from our key allies, and pledge before Glasgow to at least half our emissions (below 2005 levels) by 2030.
- Australia can help accelerate decarbonisation in our region by shifting from fossil fuel exports to clean exports and making smart use of development assistance.
- > As part of the 2022-23 Federal Budget papers, the federal government should publish a statement on how the budget as a whole addresses the climate security challenge.
- The Federal Government should urgently complete an Integrated Climate and Security Risk Assessment.

Foreword

The Climate Council has written a ground-breaking report documenting in vivid detail the devastating climate risks facing Australia, from persistent wildfires to unsparing heat and rising temperatures, to lifechanging water insecurity in Australia's near region. All Australians, and citizens around the world, should take heed of the impending climate disasters awaiting Australia.

Yet it is not too late for responsible action by Australian leaders. This report provides actionable recommendations that can immediately begin to address Australia's climate threats, starting with a commitment to more than half emissions this decade, in line with the new 2030 emissions reduction target from the US Government. Australia should conduct a Climate Security Risk Assessment, called for in the 2018 Senate Inquiry, and comparable to climate risk assessments being conducted by the US, UK and New Zealand. Most importantly, Australia needs to mobilize a "whole of nation" approach and to work closely with its Asia-Pacific allies, from small and climate vulnerable island nations, to the US.

Australia's global leadership will be measured by its ability to transition its economy to a lower carbon future and ensure a climate resilient and prosperous future. The ingenuity and innovation that has been Australia's trademark can be mobilized to create a climate-secure future. Australia should act with alacrity to address its most pressing climate security risks, both for the sake of its citizens, the Asia-Pacific region, and the future of the world.



Sherri Goodman Secretary General, International Military Council on Climate & Security Former Deputy Undersecretary of Defense (Environmental Security)



Figure 1: Bushfire smoke from the 2019-20 Black Summer fires smother Sydney.

The ingenuity and innovation that has been Australia's trademark can be mobilized to create a climate-secure future.

1. Introduction

"<u>None of the world's challenges</u> loom as large as climate change."

Antonio Guterres, UN Secretary General, 15 May 2018

Security at its most basic level is about freedom from harm or freedom from fear of harm. In the face of security risks or challenges, governments must prioritise investment to mitigate harm. As we are experiencing with COVID-19, this choice is made more complicated by competing frames of security – such as health and economics – and competing scales of security: local, national, regional or global. As pressures on resources grow, choices on where to get best value for the security dollar must be made. So where do the biggest risks lie?

In the World Economic Forum's 2021 Global Risks Report, the top 3 identified risk by hazard are categorised as environmental for the medium and long term (WEF 2021). United Nations Secretary General Antonio Guterres described climate change as an existential risk in 2018. While this year the United States Secretary of Defence Lloyd J Austin III and naturalist David Attenborough are also among the many voices calling out climate change as our pre-eminent risk (Austin 2021; UN 2021). Unsurprisingly it is one of four main research areas at the Centre for the Study of Existential Risk in Oxford.

This convergence of agreement from science, political and security leaders demands our attention. An existential threat means that climate change threatens the very survival of humanity. Nothing is bigger or more urgent. Without far stronger action to curb greenhouse gas emissions, climate change may reach tipping points (Steffen et al. 2018). But even if we act fast enough to avoid this worst-case scenario, there is now emerging evidence that climate change amplifies other security risks – including the risk of conflict or war (IMCCS 2021).

"Today, no nation can find lasting security without addressing the climate crisis. We face all kinds of threats in our line of work, but few of them truly deserve to be called existential. The climate crisis does."

Lloyd Austin, US Secretary of Defense, 22 April 2021

Environmental risks now regularly appear in security and geopolitical assessments and are becoming a strategic priority for many nations. Protecting access to key resources has always been at the centre of geopolitics, but now the definition of 'resources' has expanded to include a safe planetary environment, leading to expanding and converging concepts of planetary and ecological security (Schoonover et al. 2021). In Australia these risks are evident not only in worsening bushfires, droughts, floods and sea level rise but also in system vulnerabilities, where natural hazards made worse by climate change intersect with a society which is exposed and vulnerable (CSIRO 2018). Australia is one of the nations most exposed to economic, health and other risks from climate change and is situated in the most vulnerable region.

Figure 2: View from HMAS Adelaide arriving in Eden, 5 January 2020.



The Working Group I contribution to the IPCC's Sixth Assessment Report – the most comprehensive overview of the physical science of climate change for almost a decade – outlined a narrow path to avoiding climate catastrophe, but only through immediate, deep and sustained emissions reductions (IPCC 2021).

Given that climate change is both an existential risk, as well as a risk amplifier, you would expect it to figure prominently in our security thinking and investment. Unfortunately, this is not the case. In 2018, the final report of the Senate Inquiry into the Implications of Climate Change for Australia's National Security identified climate change as an existential threat and called for a national climate and security threat assessment. Four years later this first step is yet to occur and climate change remains in the margins of our defence and foreign affairs and trade strategies. Climate-related activities receive very little government spending relative to many other investments. Our spending is out of step with key allies such as the US, United Kingdom, Japan and New Zealand.

Figure 3: A girl plays in bushfire smoke that blanketed Sydney during the 2019-20 fires.



This report outlines what the research tells us about the relationship between climate and security. It highlights significant risks within our region that could be realised in the future. Taken alone, any one of these risks might provide cause for concern and increased investment. However, as the report outlines, we are out of step with key allies and international thinking on climate and security. Australia has better options to address these risks, and they are eminently affordable in the context of overall government spending. Moreover, there are many examples of how public funds, including fossil fuels subsidies, are actively undermining our security by fuelling climate change. Australia must make smarter choices, based on a pragmatic assessment of climate and security risks and the range of possible interventions. Left unaddressed, these risks threaten our security as a nation.

Figure 4: Drought in Kerry, Queensland.



2. Climate change as a driver of insecurity



2.1 Lessons from history

Climate and security have a long relationship. Writing over 2,000 years ago, the preeminent Chinese strategist Sun Tzu places the environment, climate and weather among his five initial estimations of national power. More recently, in a comprehensive longitudinal study, the historian David Zhang mapped the rise and fall of Chinese dynasties (Zhang et al 2006). Combining scientific data with military records, his mapping shows a strong correlation between temperature variations (both hot and cold) and conflict, stretching back 4,000 years.

The long-run effects of climate on conflict in Europe, North Africa, and the Near East during the Little Ice Age 1400-1900 CE have also been examined using a similar approach. This work has shown that the cooler regional climate during this period was associated with increased conflict. The study also concluded that the adverse effect of climate change intensifies with its duration (Iyigun et al. 2017). While this work looked at the relationship between climate and conflict during a cooling period, it identified a nexus between climate change, food security and conflict. This nexus is at the centre of other historical research into societal collapse. Climate change has been proposed as a factor in the collapse of several civilisations. This includes the Western Roman Empire in Europe (Harper 2017), the Anasazi in North America, the Maya in Central America (Diamond 2004) and the Harappan civilisation of the Indus valley (Clift 2009). It is sobering to think that these outcomes were the result of natural climate variations, which were smaller and less rapid than the current anthropogenic climate change we are experiencing.

While causal relationships are complex, history helps us identify a recurring pattern. Where changes in climate stress natural systems, this leads to changes in food and water availability. When these changes combine with vulnerable societies, this creates further compound risks to human health, resources and livelihoods. These risks can in turn lead to further national or international security threats such as forced migration or war. Conflict is not the inevitable outcome, but history does provide a warning of what might occur if our current global warming trend is not addressed.

"Ask yourself who has gained the advantages of heaven and earth?"

Sun Tzu, The Art of War

BOX 1: CLASSIC MAYA COLLAPSE

The ninth century collapse and abandonment of the Central Maya Lowlands in the Yucatán peninsular region is perhaps the best-known historical example of climate-related collapse. The ancient Maya confronted long-term climatic aridification, experienced as century-level or longer dry periods. At the same time, largescale Maya landscape alterations and demands placed on resources and ecosystem services generated fragile environmental conditions that were compounded by increasing climatic aridity. These changing socioeconomic and environmental conditions generated increasing societal conflicts, diminished control by the Maya elite, and led to decisions to move elsewhere in the peninsular region rather than incur the high costs of remaining in place.

Figure 5: Temple of the Warriors, Yucatán.



2.2 Insights from data

Several modern studies have built on historical understandings by using big data analytics. These studies now map the role of climate change in recent conflicts in great detail and conclude that there is ample evidence that links climate change to risks of fragility and conflict (Detges et al. 2020). This work has led to new models of climate and security that help us identify and address the root causes of security risk.

By using approaches which combine environmental, disaster, food, water, human, financial, infrastructure, information,

Figure 6: An Integrated Risk Model.



economic, political, military, national and international security dimensions, a comprehensive systems picture can be generated.¹ For example, the Weathering Risk Methodology (Rüttinger et al. 2021) developed by the Potsdam Institute and Adelphi in support of the United Nations identifies pathways that show how climate change can affect peace and security and what concrete actions can be taken to prevent and reduce these climaterelated security risks. These pathways link climate stressors to primary effects which further cascade through vulnerable societies, creating compound risks or ultimately traditional security risks. This comprehensive, linked-up pathway enables us to identify the best ways to intervene in order to prevent the most undesirable outcomes. In the military this is described as "getting the best bang for your buck".

By using approaches which combine security risks from multiple sectors, a comprehensive systems picture can be generated.

¹ This list is not exhaustive. While the integrating concept is the same, different countries use different sets of security risks. China for example included: political, homeland, military, economic, cultural, societal, science and technology, information, ecological, resource and nuclear aspects in its 2014 Holistic Security Strategy (Ministry of Foreign Affairs of the People's Republic of China 2021). The UK in its recent Integrated Review of Security, Defence, Development and Foreign Policy covers, military, diplomacy, development, economics, technology, information, cyber and environmental security dimensions (HM Government 2021).

2.3 Understanding the relationship between security risks and cascading and compounding risks

The type of security risks that arise from climate change are called compounding or cascading risks. These types of risk are challenging to manage. There are often multiple factors involved in the final outcome. And while the general trajectory of climate and security risks is now well

understood, how these risks play out in any given circumstance will be influenced by our capacity to understand and prepare for them as well as in our adaptive capacity and the strength of our governance and resilience mechanisms.

Figure 7: Legazpt, Philippines, 2016. Armed Forces Philippines, US Navy Seabees, Marines, Air Force and Army engineers working together to build a new school for local children.



BOX 2: VIETNAM

Vietnam's national interests are closely tied to the sea, and it is highly exposed to climaterelated changes to the surrounding ocean. The nation's biggest climate challenge is the impact on its fisheries and aquaculture. Vietnam's aquaculture production is concentrated in the Mekong River Delta where sea level rise is causing saline intrusion into brackish and freshwater hatcheries, depleting yields. At the same time, riverine flooding is forcing more farmers to turn towards fishing.

A comprehensive study of the importance of fisheries to national economic and food security ranks Vietnam as the most sensitive country in the world.

Migration of economically vital fish stocks into more northern waters claimed by China is an emerging security concern. Southeast Asia's open sea fisheries are located amidst a complex security environment featuring several overlapping maritime territorial claims. Vietnamese fishing vessels following the northward fish migration or reacting to fisheries depletion within their Exclusive Economic Zone (EEZ) risk confrontation with Chinese patrol vessels, inflaming existing maritime territorial disputes. Escalating confrontation over fisheries in the South China Sea has led to violence in the past and risks a wider regional security conflagration potentially involving the United States and others.

Adapated from IMCCS 2021.



Figure 8: Fisherman hauling a net on the Mekong River.





In **cascading risks**, the impact of a physical event generates a sequence of events that result in a pathway or flow of physical, social, economic, political or military disruption. Thus, a single initial impact can trigger multiple flow-on risks. Cascading effects are complex and multi-dimensional and evolve constantly over time. For example, in Vietnam impacts to natural systems affect agriculture and aquaculture, which in turn affects livelihoods, forcing changes to the places where fishing activities occur, and potential for transboundary conflicts. Cascading risks can be thought of as "risk multipliers".

In **compounding risks**, the risk impact in one sector adds to or amplifies risks in another sector. For example, in Vietnam existing transboundary disputes and great power dynamics amplify the risk of fishing disputes.

The bottom line is that without appropriate action, climate change will mean more social fragility, less peace and less security.

It therefore makes sense to intervene before climate-related risks cascade or compound into significant security issues. This is even more important now than in the past. Security threats now have the potential to escalate to nuclear warfare – which also poses an existential risk to global civilisation. Using a term coined in the US Department of Defense in 2007, security planners often describe climate change as a "threat multiplier" – it has the potential to amplify other drivers of insecurity (Goodman 2007).

In the following section of the report, we look at how climate change is driving security concerns in Australia's region through two scenarios. In the first (or most likely) scenario we look at how failure to rise to the challenge of climate and security is already leading to a loss of geopolitical influence for Australia. In the second (or most dangerous) scenario we look at one of the more serious and pressing concerns – the potential for regional conflict.

3. Climate and security risks in our region



3.1 Regional overview

The Asia-Pacific region is among the most vulnerable to water insecurity due in part to changes in the hydrological cycle brought on by climate change. Asia's 10 major rivers, including the Indus, Ganges, Brahmaputra, Irrawaddy, Mekong, Yangtze and Yellow, are fed by glaciers on the Tibetan Plateau. These rivers flow for thousands of kilometres through some of the most populous regions on Earth, and form an immense arc of coastal river deltas. The Indus, which flows along the length of Pakistan and into the Arabian sea, may be the world's most at risk mountain water source (Immerzeel 2019). Melting glaciers, shifting rainfall patterns and more erratic river flows are creating greater risks of riverine flooding, water shortages, and transboundary disputes. This region supports almost two billion people and is home to three nuclear armed powers in Pakistan, India and China.

With rising temperatures and shifting rainfall patterns comes increased risk of extreme weather events and the Asia-Pacific region is one of the most exposed to these climate stressors. From 2000 to 2019 the list of countries most effected by natural

Figure 10 (left): Waiting for assistance in the floods, Assam, India. Figure 11 (right): Displaced people fleeing Sindh in 2010 streamed into Balochistan in Pakistan.







Figure 12 (left): A farmer works the land during drought conditions. Figure 13 (right): Flooding hits a community in the Phillipines.

disasters includes Myanmar, the Philippines, Bangladesh, Pakistan and Thailand (Eckstein 2021). Heat also directly effects humans, impacting health and productivity. Pakistan and India are currently most exposed to this risk - but at a 1.5 degree increase in temperature, Australia, Bangladesh, Cambodia, and Thailand also face exposure to extreme risks (Andrews 2018).

Collectively these primary climate stressors are already causing risks that cascade into food and livelihood security. Ocean resources such as coral reefs and fisheries, which are the backbone of many national economies and vital for sustaining traditional livelihoods, are under threat, driving up food insecurity. Rising heat also affects agricultural productivity and marine based industries with regional countries such as Malaysia, Indonesia and the Philippines facing substantial risks (Glasser 2021). These risks also lead to economic damage at the national scale. Thailand, Indonesia, Malaysia and the Philippines are assessed in the most at-risk bracket for negative change in GDP related to climate change (Freitas et al. 2019). China, Indonesia, India, Papua New Guinea, Laos, Vietnam, the Philippines and Bangladesh are exposed to increases in sovereign credit risk related to climate change (Bloomberg 2021).

Not surprisingly, a range of compound risks are emerging in the Asia-Pacific region. Water insecurity is perhaps of greatest concern, aligning as it does with existing major power tensions between India, Pakistan and China. Increased displacement and forced migration due to sea level rise and reduced productivity of marine and land resources are also forecast. Many countries, including all Small Island Developing States are at risk of losing land and thus resources,



Figure 14: Bleached coral in the Maldives, 2016.

while the low-lying atolls are at risk of complete inundation. The impacts of climate change on economic and food security in South and Southeast Asia, both in the form of slow-onset deterioration and intensifying disasters, also risk aggravating existing antistate grievances and thus spurring protests and riots (Jayaram 2019).

These compound risks intersect with existing international relationships or disputes creating flow on transnational or national security risks. Among regional nations, Malaysia, Thailand, India, Pakistan, New Zealand and Australia rate as particularly exposed to transnational climate risks (SEI TCI Index 2016). In the following case studies, we look at two scenarios from an Australian perspective. The first scenario – loss of geopolitical influence – is being realised now. The second – risk of regional war is more uncertain but also more dangerous. **Figure 15**: A very large proportion of people in the Asia-Pacific region depend on water from rivers that all have their source on the Tibetan Plateau. The melting of glaciers and shifting rainfall patterns are significantly affecting the flow in these rivers, raising the risks of riverine flooding, water shortages, and transboundary disputes.



3.2 Scenario 1: Loss of geopolitical influence

Australia's failure to take stronger action in the face of mounting security risks from climate change is already coming at a significant cost to our international standing and influence. This is most obvious in terms of Australia's relationship with Pacific Island Countries, although climate change has also recently emerged as a significant point of contention between Australia and its closest allies including the US and UK.

Pacific Island Countries have long recognised climate change as the "the single greatest threat to the livelihoods, security and wellbeing of the peoples of the Pacific". This was reaffirmed in the 2018 Boe Decleration on Regional Security, to which Australia is also a signatory. Over the years Pacific Island Countries have made many attempts to encourage Australia to adopt stronger emissions reduction targets and more specifically to encourage Australia to hasten its transition beyond fossil fuels. Australia's rebuffing of these entreaties has been met with growing impatience. For example, at the 2019 Pacific Island Forum leaders' meeting in Tuvalu, Australia drew fierce criticism from many Pacific Island Leaders including Frank Bainimarama, Prime Minister of Fiji and Enele Sopoaga, then Prime Minister of Tuvalu and Chair of the Pacific Islands Forum

Figure 16: The Australian Government's inaction on climate change is harming Australia's standing in the Pacific.





Figure 17: The burning of coal oil and gas is driving climate change.

In the past, Pacific Island Countries have had to rely mostly on their moral authority and acts of creative diplomacy to try to nudge Australia and other big emitters to take stronger action on climate change. However, today Pacific Island Countries find themselves once again caught in the centre of geopolitical powerplays, as the west including the US, Europeans, and Australians, look to achieve favourable outcomes in the face of an ever more powerful China (Morgan 2018). With this return of great power competition, Pacific Island Countries have greater leverage to push Australia to step up its efforts to confront the climate crisis. If Australia wishes to remain a trusted and valued member of the Pacific family, it will need to demonstrate that it is taking the region's number one security concern seriously (Bradshaw 2019). With other countries including China, UK, France, and Japan all keen to grow their presence and influence in the region, Pacific Island Countries have more choices when it comes to development and security partners, and Australia should not assume it will be at the top of that list (Wallis 2021). Australia's strained relationships in the Pacific are made even more stark in contrast to our New Zealand neighbours who continue to strengthen longstanding ties with the Pacific Island Countries.

While tension between Australia and the Pacific over climate change is not new, in more recent times Australia has found itself facing mounting diplomatic pressure from more powerful actors. Through the Trump years, Australia faced no pressure from the US to step up its commitments on climate change. On the contrary, Australia was able to hide behind the failings of the US. That changed dramatically with the election of President Biden, who has placed climate change at the centre of US foreign policy and mounted a major diplomatic effort to encourage all countries, including Australia, to strengthen their commitments. The UK, President of COP26, along with EU states, are also working to accelerate their own actions and to catalyse stronger action globally. The US and UK now treat action on climate change not only as a paramount security threat, but as an economic and geopolitical opportunity, which can reaffirm their place in the world at a time when their influence is declining.

3.3 Scenario 2: Water insecurity and war

Asia has achieved impressive growth in economic and social welfare during the last decades and many of its economies are key trade partners for Australia. Good water management and human capital development remain vital to support economic growth and increase overall social wellbeing, especially after the COVID-19 pandemic. Despite these achievements, in the Asia-Pacific (home to 60% of the world's population), 1.5 billion people living in rural areas and 0.6 billion in urban areas still lack adequate water supply and sanitation. Of the 49 Asian Development Bank (ADB) members from Asia and the Pacific, 27 face serious water constraints on economic development, and 8 are yet to sufficiently protect their inhabitants against water-related disasters (ADB 2020).

Strengthening national water security is a must for improving the quality of life of all people in the Asia-Pacific region. Recovering from the setback caused by COVID-19 and adapting to climate change require that all countries put water security at the top of their agendas. Water security enables economic growth and provides the conditions for a healthy and prosperous population.

Figure 18: A farmer works through difficult drought conditions.





Figure 19: The national water security index shows the five dimensions by which to measure water security in each nation. Source: ADB 2020.

Water is also among the most contested resources in South Asia. Climate impacts on the hydrological cycle (for example, shifting rainfall patterns, droughts, and glacial recession) will put additional pressure on already strained water resources. A case in point is the contentious relationship between India and Pakistan regarding the water resources of the Indus River (the world's most vulnerable water tower). As populations and agricultural demands increase, per capita water availability in both countries has declined and risks declining further. This threatens to further increase tensions between India and Pakistan.

The potential for any of these transboundary water tensions to escalate into conflict would have profound consequences for Australia. The Asia-Pacific region is the engine room of global manufacturing. Any major disruption to this region threatens supply of critical global resources. Australia, as one of the most trade-exposed OECD nations, could experience critical shortages across multiple sectors (Productivity Commission 2021). This in turn creates risk to our livelihoods and social cohesion.

And while most water disputes fuel internal rather than international conflict, the potential for war cannot be discounted (Pacific Institute 2019; CNA 2017). A worst case might see conflict involving India and Pakistan drawing in the US or China. Any US-China conflict could escalate into a major war, which Australia could also be drawn into through its alliance mechanisms with the US or India. Secondly, even if great power conflict is avoided, both China and India are major trading partners for Australia, and greater internal instability in either country would also create economic shocks for Australia.





Out of step and out of time



With substantial climate and security risks on our doorstep, Australia is falling behind. Other international organisations and nations are rapidly broadening traditional notions of national security and getting a grip on where priority action needs to occur.

The UN launched its Climate Security Mechanism (CSM) in 2018 in order to raise awareness about climate security within the UN system. This is supported by the Climate Security Expert Network. Within the European Union, a more integrated approach involving climate in the context of peace and security is well underway, via a roadmap detailing the integration of climate change into the EU's Common Security and Defence Policy. Moreover, senior mediators based in EU delegations receive training specifically focused on introducing climate change in their work. This will enhance the understanding of the links between climate change and conflict and may better enable mediation efforts to address the root causes of conflict (Zhou 2017). More recently, in June this year, NATO released its first Climate Change and Security Action Plan. In addition to military action on climate change risk awareness, mitigation and adaption, it called for increased dialogue with civil society, academia and industry on climate change and security issues (NATO 2021).

The US has long been a leader on the military aspects of climate security but has recently adopted a more integrated approach. Biden Executive Order of 27 Jan 2021, on Tackling the Climate Crises at Home and Abroad (Biden 2021) states: "domestic action must go hand in hand with United States international leadership, aimed at significantly enhancing global action." Recognising the integrated nature of climate and security risks, the Executive Order takes a government-wide approach to the climate crisis and establishes a climate task force under the chairmanship of John Kerry, the Special Presidential Envoy for Climate. The task force includes the heads of Treasury, Defense, Agriculture, Commerce, Labour, Health and Human Services, the Interior, Transportation, Energy, Housing and Urban Development, Homeland Security, Environment, Science and Technology and the US Attorney General.

Among western nations, the UK has gone furthest, legislating an annual Independent Assessment of UK Climate Risk. The latest iteration, released in June 2021, assesses climate risks in the UK across natural environment, infrastructure, health, communities and built environment, business, and international dimensions (Climate Change Committee 2021). The report assesses that "extreme weather events in the UK and globally can create cascading risks that spread across sectors and countries, with impacts an order of magnitude higher than impacts that occur within a single sector". Like the US, the UK too sees the need to integrate across security, defence, development and foreign policy sectors. Its most recent review, released in May this year, looks beyond the traditional scope of security with climate change, soft-power and technological innovation being cast as some of its key pillars (McLaughlin 2021; HM Government 2021). The Integrated Review recognises that tackling climate change requires a global response. However, it also recognises that the climate crisis provides the UK with a unique opportunity to engineer integrated solutions. In 2021 and beyond, the British Government will make tackling climate change and biodiversity loss its number one international and security priority. The UK Ministry of Defence has just issued a new climate change and defence strategy.

Both Germany and the EU have issued new strategies and guidelines for the Indo-Pacific that identify climate risk as a priority for regional engagement. In March 2021, the Quad leaders highlighted climate change as a shared priority and established a climate working group to develop options for regional collaboration.

New Zealand's Strategic Policy Statement 2018 recognised climate change for the first time as a major driver of military operations (Ministry of Defence 2018a). The policy statement also took a holistic view of security recognising the role Defence plays in promoting the overall wellbeing and resilience of New Zealand communities and the environment. New Zealand then moved to implement policy, producing a followon defence readiness assessment in 2018, which linked climate effects, environmental impacts, social impacts and security implications (Ministry of Defence 2018b). An implementation plan – Responding to the Climate Crises – followed in 2019 (Ministry of Defence 2019).

Pacific Island Countries have worked for many years to bump the issue of climate and security up the agenda of the UN Security Council, including championing the appointment of a new Special Representative of the Secretary-General on Climate and Security. The Boe Declaration on Regional Security takes a holistic, human-centred approach to security. It reaffirms climate change as the "single greatest threat to the livelihood, security and wellbeing of the peoples of the Pacific."

China too adopts a holistic view of climate and security. In November 2019, China's Policies and Actions for Addressing Climate Change 2019 was published. The document quoted Xi Jinping's earlier instruction that "addressing climate change...is not only the internal need to achieve sustainable development but also the due responsiblity to promote the development of the community with a shared future for mankind."

Climate change is also becoming more central to the Australia-US alliance and to regional engagement. And right now, Australia is looking for security in all the wrong places. We are not in the race to deamplify risks; we are not even at the starting line. Our inaction on climate change is nothing less than a failure to pull our weight towards collective security in our region.

Rising to the security challenge



With emerging international consensus on the security risks of climate change, Australia can and must respond to these risks. This is not just a Defence problem - it extends to all aspects of Australian security and foreign policy including policy responses on energy transformation, on how we build resilience to disasters and how we invest in the economy as we recover from COVID-19.

The 2021-22 Federal Budget does address some of these risks. Building Disaster Resilience is a headline budget initiative with the establishment of the National Recovery and Resilience Agency (NRRA) and enhancements to Emergency Management Australia. An allocation of \$1.5 billion over five years from 2020-21 to improve Australia's capability to better prepare for, respond to, and recover from natural disasters. This is on top of the approximately \$2 billion dedicated to the National Bushfire Recovery Fund in response to the Royal Commission into National and Natural Disaster Arrangements. A further \$209.7 Million has been allocated to build an Australian Climate Service (Budget 2021-22 Securing Australia's Recovery

Overview). The Drought Response, Resilience and Preparedness Plan is allocated an additional \$212.0 million over four years. A further \$1.5 billion over four years is allocated to the Murray Darling Basin (Australian Government 2019; Commonwealth of Australia 2021a; 2021b; 2021c). Overall, significant funding, approximately \$10 billion, has been allocated to build resilience; spread out across multiple Departments and across multiple years.

When it comes to addressing the root causes of climate-related risks by reducing greenhouse gas emissions, investment is more patchy or harder to discern given the lack of a comprehensive climate funding statement. Though it is almost certainly less than the amounts spent on adapting to the impacts. Futhermore, modest investments in government policies such as the Technology Investment Roadmap and Emissions Reduction Fund are more than offset by continuing fossil fuel subsidies, which in 2020-21 were estimated at \$10.3 billion (The Australia Institute 2021).



Figure 21: Looking at forecast Australian Federal Government spending, it is clear that we are spending vastly more on dealing with the problems driven by climate change, rather than addressing the causes. In this figure, spending increases by factors of 10 as we move further to the right of the Integrated Risk Model.

In contrast, Defence is one area where there is significant investment to mitigate risk in general. Australia will spend over 2% of GDP on the Defence budget and this is forecast to increase over the next decade. This equated to a consolidated annual defence funding line including both the Department of Defence and the Australian Signals Directorate of approximately \$AU45 billion (Commonwealth of Australia 2021d, Hellyer 2021). This means that just looking at Defence alone the Government is forecast to spend much more (approximately \$100 billion) on traditional security threats as it does on resilience to climate change.

Looking at current funding across the integrated risk spectrum, spending increases by factors of 10 as we move further to the right of the Integrated Risk Model, from addressing the causes to dealing with the fallout (see Figure 21).

In a year dominated by COVID-19, another way of looking at Australia's funding commitments is to benchmark our commitments against other nation's COVID-19 recovery initiatives. Here too, Australia has missed the opportunity to address climate change with only an estimated 1.95% of recovery spending assed as "green". Compared with Canada (74.5%); Japan (26.54%); UK (20.25%); China (11.93%); EU (9.94%); US (8.77%) and India (4.77%) (OECD 2021).

Despite the sums being spent, security outcomes are declining for Australia and the globe. The latest Defence Strategic Update notes that regional and global security are worsening - a view shared by many western nations. Looking at security from another angle, the World Peace Report Index reports a deterioration in peace (Institute for Economics and Peace 2021). Water and food insecurity are growing (Worldbank water security diagnostic initiative; FAO 2021). Democracy is in decline (The Economist Intelligence Unit 2020). Environmental and ecological security is perilously close to a point of no return (IPCC 2021).

Overall, Australia's current balance of investment does not appear to be working to mitigate or reduce risk. Other countries are prioritising investments differently, setting significantly stronger emissions reduction targets for 2030, stepping up support for climate action beyond their shores, and investing heavily in renewable energy as they work to rebuild their economies from COVID-19. All G7 countries are now committed to roughly halving their emissions by the end of the decade.

Such steps are not only contributing to collective security outcomes by treating the root cause of the problem, but also come with both economic and geopolitical opportunities. Australia has almost unrivalled potential for renewable energy: It is one of the sunniest and windiest countries on Earth and is also sitting on substantial reserves of minerals needed for the global energy transition, including lithium and rare earth metals. Using this natural advantage would both advance Australia's future prosperity and increase its geopolitical influence. Conversely, failure to step up our domestic emissions reductions could see Australia facing increasing economic pressure in the form of carbon border adjustments and other measures.

BOX 3: ENERGY SECURITY: CHINA TAKES ITS OPPORTUNITIES

The International Renewable Energy Agency has identified 3 factors required for a secure renewable energy system: (1) a large renewable energy capacity, (2) adequate sources of rare earths and minerals, and (3) technological innovation (IRENA 2019). Australia has these advantages but is failing to take them.

In constrast, China is solidifying control over the critical minerals of lithium, graphite, cobalt, and nickel. Chinese firms account for about 80 percent of the total global output for raw materials for advanced batteries. China also has the largest minerals processing industry in the world, controlling the processing of almost 60 percent of lithium, 65 percent of nickel, and more than 80 percent of cobalt. China also refines 100 percent of spherical graphite.

Further along the supply chain, China also leads in battery assembly gigafactories that turn processed minerals into battery packs. Over 130 of the more than 180 gigafactories planned or operational in the world are or will be in China. Completing the loop and demonstrating it takes sustainability seriously, China dominates battery recycling because it has built up critical infrastructure to recycle lithium ion batteries from consumer electronics. About 70 percent of the lithium ion batteries in the world are recycled in China and South Korea. In less than one decade, 11 million metric tons of lithium ion batteries will reach the end of their service lives (Schadlow 2021).

Indeed, the dominance of China across this supply chain should come as no surprise. China's holistic approach to security allows it see and take opportunities. China has been strong at identifying and controlling some foundational technology sectors and platforms. Like financial technology or broadband cellular networks, advanced energy technology will be the critical platform. China has a global plan that includes "new energy" as a key area of focus and will not easily watch its advantages melt away.

The dominance of China across this supply chain should come as no surprise. China's holistic approach to security allows it see and take opportunities.

BOX 4: THE ROLE OF CLIMATE FINANCE AND DEVELOPMENT ASSISTANCE IN BUILDING REGIONAL SECURITY

A decade ago, the world's developed countries agreed under the UN Framework Convention on Climate Change to provide US\$100bn annually by 2020 to support developing countries with responding to climate change.

Known as climate finance, such support is vital to enabling vulnerable countries to adapt and build resilience to the impacts of climate change. It is also essential to reducing global emissions by assisting less developed countries with transitioning to clean energy and getting on a path to net zero.

Australia's contribution to climate finance has been mixed. On the positive side, a majority of Australia's contribution has gone towards supporting climate change adaptation in some of the most vulnerable countries. A high proportion has been allocated to the Pacific, and all has been in the form of grants.²

On the negative side, the scale of Australia's overall contribution has been small – constituting only around 0.3% of global climate finance flows – and has grown only marginally over the past decade. It has also been drawn from a heavily diminished aid program, arguably diverting funding from other priorities. Australia also withdrew from the Green Climate Fund – the most important global fund for supporting climate action worldwide. In earlier years, Australia had played an important leadership role in the Green Climate Fund, including serving as co-chair of its board. Climate finance is not a zero-sum investment especially for a country like Australia that is surrounded by some of the most vulnerable countries on Earth to climate change, and which itself is facing severe threats to its communities and ecosystems. Our own security and prosperity are tied to that of the countries around us and our future depends on all countries moving beyond fossil fuels.

Experience has shown how relatively small investments in climate change adaptation can have an important security dividend. This is particularly true for local community-led adaptation initiatives. When local communities have access to information on climate change risks, and are empowered to develop solutions that fit their priorities and build on their existing strengths and resources, they are able to reduce their long-term vulnerability to climate change through a range of measures from diversifying their livelihoods to better disaster preparedness (McNamara et al. 2020, Clissold et al. 2018).

Climate finance can also be used to help communities gain access to electricity through renewable energy. Of the hundreds of millions of people worldwide who still live without electricity, a majority live beyond the reach of traditional energy grids. Local renewable schemes therefore provide the quickest and least cost means of accessing electricity for lighting, refrigeration, and other needs (Oxfam 2017).

² By contrast, much climate finance globally has consisted of loans to countries that are already struggling with debt, and only a small portion has supported adaptation compared to mitigation (reducing emissions). As the world's least developed countries have a very low level of emissions yet face very severe impacts from climate change, adaptation to the impacts of climate change is often a more immediate priority than mitigation. However, as mitigation activities, and in particular renewable energy, are often able to offer a faster return on investment, it has generally been easier to attract funding for mitigation, leaving a large and growing funding gap globally for adaptation.

BOX 4: CONTINUED

Access to affordable and reliable electricity through locally-owned renewable energy supports jobs, local economic development, and the ability of a community to adapt to new challenges. It is an example of how investing in climate solutions can leave communities stronger and more resilient while also avoiding greenhouse gas emissions. The benefits of renewable energy are no clearer than in the Pacific, where renewable energy is freeing communities from expensive diesel imports, increasing rates of electricity access in remote communities, and enabling countries to be more energy-independent and thereby less exposed to volatile fossil fuels markets. At around AU\$300 million a year, Australia's current contribution to international climate finance is dwarfed by other spending, including continued support for the fossil fuel industry. It is also well short of what can reasonably be deemed a fair share towards internationally agreed climate finance goals. While it can be no substitute for far stronger efforts to reduce Australia's greenhouse gas emissions, scaling up Australia's financial support for climate change adaptation and mitigation in our region is an essential component of building security in the face of climate change.

At around AU\$300 million a year, Australia's current contribution to international climate finance is dwarfed by other spending, including continued support for the fossil fuel industry.

A PATHWAY TO ACTION

It is clear that there is emerging international consensus on the security risks of climate change, that Australia can and must respond to these risks and that there are a number of opportunities to mitigate these risks. So what are the steps Australia must take to tackle the climate security risk? The first step is to understand risk from an integrated perspective, something that is well advanced among key allies such as the US, UK and NZ and which has been called for in Australia by the former military leaders in the Australian Security Leaders Climate Group.

The second step is to look at where we can intervene to address risk. Australia must prioritise investment that addresses the root cause of climate risk. This means ensuring the rapid de-carbonisation of the Australian economy, while also working to support decarbonisation beyond our shores.

The solutions to the challenges of climate and security won't come from any one sector as risks cascade and compound across sectors. A whole of nation approach, drawing on values and ideas from communities, businesses, cities, academic and notfor-profit sectors as well as all levels of government is needed. Luckily, with modern ICT and collaborative approaches such as citizen assemblies we have the collaboration technologies to make this happen.

Understanding the full nature of the climate and security challenge and the potential range of solutions gives us a better idea of priorities for action. While the challenge is complex and messy, this is situation normal for security planners who almost always make decisions under some degree of uncertainty. There are tools for this too. The Australian Department of Defence already uses complex problem-solving methodology such as multi-criteria decision analysis, but only within a narrowly defined "military security" perspective.



Figure 22: Emissions from the fossil fuel sector, including the gas sector, are driving the climate impacts being seen today.

This method of analysis allows a large problem to be broken into manageable pieces while enabling comparisons between "apples and oranges". Going forward, Federal Government spending should be based on such an approach, in which all investments are assessed according to how they contribute to addressing the challenges of climate and security.

6.

Recommendations

1

To address the root causes of climatefuelled insecurity, Australia should:

- Reduce its emissions by 75% below 2005 levels by 2030 and achieve net zero by 2035. As a first step, Australia must at least match the updated commitments from our key allies, and pledge before COP26 in Glasgow to at least half our emissions (below 2005 levels) by 2030.
- Help accelerate decarbonisation in our region and globally by shifting from fossil fuel exports to clean exports; working with the private sector to help repower the region's economies; and ending all support for fossil fuels.

2

To support the resilience of countries and communities in our region, Australia should:

- Increase support for climate change adaptation through Australia's development assistance program.
- Increase investment in research in climate change adaptation, including areas such as climate-resilient food systems.
- Support regional and global initiatives for the effective governance of water resources in the face of climate change.

3.

To ensure an integrated, whole-ofnation approach to climate change and security, Australia should:

- Undertake an Integrated Climate and Security Risk Assessment, including all security sectors.
- > Develop a whole-of-government decisionmaking process for the Federal Budget.
- As part of the 2022-23 Federal Budget papers, publish a statement on how the budget as a whole addresses the climate and security challenge.
- Ensure a process for engaging the whole of the nation, including communities, businesses, cities, academics, the not-forprofit sector and all levels of government in developing solutions to the challenges of climate change and security.

References

ADB (Asian Development Bank), 2020. Asian Water Development Outlook 2020: Advancing Water Security Across Asia and the Pacific. Accessed at <u>https://www.adb.</u> org/sites/default/files/publication/663931/awdo-2020.pdf

Andrews, O., Le Quere, C., Kellstrom, T., Lemke, B., Haines, A., 2018. Implications for workability and survivability in populations exposed to extreme heat under climate change. The Lancet. Accessed at https://www.thelancet.com/journals/lancet/article/PIIS2542-5196(18)30240-7/fulltext

Austin, L.J., 2021. Defense Secretary Calls Climate Change an Existential Threat. U.S Department of Defense. US Department of Defence. Accessed at <u>https://www.defense.gov/Explore/News/Article/Article/2582051/defense-secretary-calls-climate-change-an-existential-threat/</u>

Australian Government, 2019. Drought Response, Resilience and Preparedness Plan Commonwealth of Australia. Accessed at <u>https://www.agriculture.gov.au/ag-farm-food/drought/drought-policy</u>

Australian Government, 2021. Budget 2021-22 Securing Australia Recovery Overview, Commonwealth of Australia 2021. Australian Government, Budget 2021-22 Budget Paper No 2. Biden, J.R., 2021. Executive Order on Tackling the Climate Crisis at Home and Abroad. The White House. Accessed at <u>https://www.whitehouse.gov/briefing-room/ presidential-actions/2021/01/27/executive-order-ontackling-the-climate-crisis-at-home-and-abroad/</u>

Bloomberg, 2021. Climate Change Raising Sovereign Credit Risk in Most Countries. Accessed at <u>https://www. bnnbloomberg.ca/climate-change-raising-sovereigncredit-risk-in-most-countries-1.1599976</u>

Bradshaw, S., 2019. Save Tuvalu, Save the World: The Climate Crisis and the Pacific. Oxfam. <u>https://www.oxfam.</u> org.au/wp-content/uploads/2019/08/2019-AC-013-Save-Tuvalu-report_FA-WEB.pdf

Chen, M. and Caldeira, K., 2020. Climate change as an incentive for future human migration. Earth System Dynamics 11, 875–883. Clift, Peter, Harappan Collapse 2009. <u>https://www.researchgate.net/</u> <u>publication/256546160_Harappan_collapse</u>

Climate Change Committee, 2021. Independent Assessment of UK Climate Risk. Accessed at <u>https://www.theccc.org.uk/wp-content/uploads/2021/07/Independent-Assessment-of-UK-Climate-Risk-Advice-to-Govt-for-CCRA3-CCC.pdf</u>

Clissold, R., Clark, T., Priebbenow, B. and McNamara, K., 2018. Panacea for the Pacific? Evaluating community-based climate change adaptation. New Security Beat, 22 February 2018. <u>https://www.newsecuritybeat.org/2018/02/panaceapacific-evaluating-community-based-climate-changeadaptation/</u> CNA, 2017. The Role of Water Stress in Instability and Conflict. Accessed at CRM-2017-U-016532. Final. <u>https://www.cna.org/CNA_files/pdf/CRM-2017-U-016532-Final.pdf</u>

Commonwealth of Australia, 2021a. Budget 2021-22, Securing Australia Recovery, Overview. Accessed at https://budget.gov.au/2021-22/content/download/glossy_ overview.pdf

Commonwealth of Australia, 2021b. Budget 2021-22, Securing Australia's Recovery Building a more secure and resilient. Accessed at <u>https://budget.gov.au/2021-22/</u> content/download/glossy_resilient.pdf

Commonwealth of Australia, 2021c. Budget 2021-22 Budget Measures Budget Paper No2 2021-22, <u>https://budget.gov.</u> <u>au/2021-22/content/bp2/download/bp2_2021-22.pdf</u>

Commonwealth of Australia, 2021d. Budget 2021-22, Agency Resourcing Budget Paper No 4. Accessed at <u>https://budget.gov.au/2021-22/content/bp4/download/bp4_2021-22.pdf</u>

CSIRO (Commonwealth Scientific and Industrial Research Organisation), 2018. Australian Vulnerability Profile. Accessed at <u>https://research.csiro.au/eap/australian-vulnerability-profile/</u>

Detges, A., Klingenfeld, D., König, C., Pohl, B., Rüttinger, L., Schewe, J., Sedova, B., Vivekananda, J., 2020. 10 Insights on Climate Impacts and Peace. A summary of what we know. Adelphi/PIK, Berlin/Potsdam.

Diamond, J., 2004. Collapse: how societies choose to fail or survive. Penguin Publishing.

Eckstein, D., Kunzel, L., 2021. Global Climate Risk Index. German Watch. Accessed at <u>https://germanwatch.org/</u> <u>sites/default/files/Global%20Climate%20Risk%20Index%20</u> 2021_2.pdf

FAO (Food and Agricultural Organisation of the United Nations), 2021. The State of Food Security and Nutrition in the World 2021. Accessed at <u>http://www.fao.org/publications/sofi/2021/en/</u>

Freitas, F., Denton, M., DeRitis, C., 2019. The Risk Management Impact of Climate Change & ESG. Moody's Analytics. Accessed at <u>https://www.moodysanalytics.</u> <u>com/-/media/presentation/2019/mas-t3d2-risk-mgtimpact-of-climage-change.pdf</u>

Glasser, R., 2021. The Rapidly Emerging Crises on our Doorstep. Australian Strategic Policy Institute (ASPI). Accessed at <u>https://www.aspi.org.au/report/rapidlyemerging-crisis-our-doorstep</u>

Goodman, S., 2007. National Security and the Threat of Climate Change. The CNA Corporation. Accessed at <u>https:// www.cna.org/cna_files/pdf/national%20security%20</u> and%20the%20threat%20of%20climate%20change.pdf Harper, K., 2018. The Fate of Rome: Climate, Disease, and the End of an Empire.

Hellver, M., 2021. The Cost of Defence ASPI Defence Budget Brief 2021-2022. Australian Strategic Policy Institute (ASPI). Accessed at <u>https://www.aspi.org.au/report/cost-defence-aspi-defence-budget-brief-2021-2022</u>

Hoojier, A. and Vernimmen, R., 2021. Global LiDAR land elevation data reveals greatest sea-level rise vulnerability in the tropics. Nature Communications 12. Accessed at https://www.nature.com/articles/s41467-021-23810-9

HM Government, 2021. Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy. Accessed at <u>https://assets.publishing.</u> <u>service.gov.uk/government/uploads/system/uploads/</u> <u>attachment_data/file/975077/Global_Britain_in_a</u> <u>Competitive_Age-_the_Integrated_Review_of_Security_</u> <u>Defence__Development_and_Foreign_Policy.pdf</u>

IMCCS (International Military Council on Climate and Security), 2021. The World Climate and Security Report 2021. Accessed at <u>https://imccs.org/the-world-climate-andsecurity-report-2021/</u>

Immerzeel, A.F. Arthur Lutz, J.E. M. Baillie, 2019. Importance and vulnerability of the world's water towers. Nature. Accessed at <u>https://www.nature.com/articles/</u> <u>s41586-019-1822-y?proof=t</u>

Institute for Economics and Peace, 2021. Global Peace Index 2021: Measuring peace in a complex world. Accessed at <u>https://apo.org.au/node/313343</u>

IPCC (Intergovernmental Panel on Climate Change), 2021. Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the Sixth Assessment Report. Accessed at <u>https://www.ipcc.ch/report/ar6/</u> wg1/#FullReport

IRENA (International Renewable Energy Agency), 2019. A New World: The Geopolitics of the Energy Transformation. Accessed at <u>http://geopoliticsofrenewables.org/Report</u>

Iyigun, M., Nunn, N., Qian, N., 2017. Winter is Coming: The Long-Run Elects of Climate Change on Conflict, 1400-1900. IZA Institute of Labour Economics. Accessed at <u>http://ftp.</u> <u>iza.org/dp10475.pdf</u>

Jayaram, D., 2019. Climate-Fragility Risk Brief South Asia. Climate Security Expert Network. Accessed at <u>https://</u> <u>climate-security-expert-network.org/sites/climate-</u> <u>security-expert-network.org/files/documents/csen_</u> <u>climate_fragility_risk_brief_south_asia.pdf</u>

McNamara, K.E., Clissold, R., Westoby, R., Piggot-McKellar, A.E., Kumar, R., Clarke, T., Namoumou, F., Areki, F., Joseph, E., Warrick, O. and Nunn, P.D., 2020. An assessment of community-based adaptation initiatives in the Pacific Islands. *Nature Climate Change* 10, 628-639. <u>https://www. nature.com/articles/s41558-020-0813-1</u>

McLaughlin, C., 2021. The United Kingdom's Integrated Review: Implications for the Indo-Pacific. Future Directions International. Accessed at <u>https://www.futuredirections.</u> <u>org.au/publication/the-united-kingdoms-integrated-</u> <u>review-implications-for-the-indo-pacific/</u> Ministry of Defence, 2019. Responding to the Climate Crisis: An Implementation Plan. Accessed at <u>https://www. defence.govt.nz/assets/publication/file/dcf3ee802b/</u> <u>Responding-to-the-Climate-Crisis.pdf</u>

Ministry of Defence, 2018a. Strategic Policy Statement 2018. Wellington, New Zealand. Accessed at <u>https://www. defence.govt.nz/assets/Uploads/8958486b29/Strategic-Defence-Policy-Statement-2018.pdf</u>

Ministry of Defence, 2018b. The Climate Crisis: Defence Readiness and Response. Accessed at <u>https://www.defence.govt.nz/publications/publication/the-climate-crisisdefence-readiness-and-response</u>

Morgan, W., 2018. Back on the Map: Pacific islands in a new era of strategic competition. Working paper number 5: School of Government, Development and International A!airs (SGDIA), University of the South Pacific. <u>https://www. usp.ac.\$/fileadmin/files/faculties/business/SGDIA/SGDIA_</u> WORKING_PAPER_SERIES___No._5_-_Complete.pdf

NATO (North Atlantic Treaty Organization), 2021. NATO Climate Change and Security Action Plan. Accessed at https://www.nato.int/cps/en/natohq/official_texts_185174. htm

Oxfam, 2017. More Coal Equals More Poverty: Transforming our world through renewable energy. Oxfam. Accessed at https://www.oxfam.org.au/wp-content/uploads/2017/05/ More-Coal-Equals-More-Poverty.pdf

OECD, 2021. Green Recovery Database. Accessed at <u>https://www.oecd.org/coronavirus/en/themes/green-recovery</u> sourced from Global Recovery Observatory Data <u>https://recovery.smithschool.ox.ac.uk/tracking/</u>

Pacific Institute, 2019. Water Conflict Chronology. Pacific Institute, Oakland, CA. Accessed at <u>https://www.worldwater.org/water-conflict/</u>

Productivity Commission, 2021. Vulnerable Supply Chains. Interim Report. Canberra. Rüttinger, L., Vivekananda J., König C., Sedova B., 2021. Weathering Risk - Methodology Paper. Adelphi and Potsdam Institute for Climate Impact Research. Accessed at <u>https://weatheringrisk.org/</u> <u>sites/default/files/document/Weathering%20Risk%20</u> <u>Methodology%20Paper_0.pdf</u>

Schoonover, R., Cavallo, C., Caltabiano, I., 2021. The Security Threat That Binds Us: The Unraveling of Ecological and Natural Security and What the United States Can Do About It. The Converging Risks Lab, an institute of The Council on Strategic Risks. Washington, DC. Accessed at <u>https://councilonstrategicrisks.org/wpcontent/uploads/2021/01/The-Security-Threat-That-Binds-Us_2021_2-1.pdf</u>

Schadlow, N., 2021. Trading One Dependency for Another. War on the Rocks. Accessed at <u>https://warontherocks.</u> <u>com/2021/05/trading-one-dependency-for-another/</u>

Steffen, W. et al., 2018. Trajectories of the Earth System in the Anthropocene. PNAS. <u>https://www.pnas.org/</u> <u>content/115/33/8252</u>

Stockholm Environment Institute (SEI), 2016. Working paper Introducing the Transnational Climate Impacts Index: Indicators of Country Level Exposure -methodology report <u>https://www.sei.org/publications/transnationalclimate-impacts-index/</u> The Australia Institute, 2021. Australian fossil fuel subsidies hit \$10.3 billion in 2020-21. Accessed at <u>https://australiainstitute.org.au/post/australian-fossil-fuel-subsidies-hit-10-3-billion-in-2020-21/</u>

The Economist Intelligence Unit, 2020. Democracy Index 2020: In sickness and in health? Accessed at <u>https://www.eiu.com/n/campaigns/democracy-index-2020/</u>

The National Bureau of Asian Research, 2019. What Kashmir's Looming Water Crisis Means for India-Pakistan Relations. Accessed at <u>https://www.nbr.org/publication/ what-kashmirs-looming-water-crisis-means-for-indiapakistan-relations/</u>

The Pacific Institute: The Worlds Water <u>https://www.</u> worldwater.org/water-conflict/

UN (United Nations), 2018. Climate change: An 'existential threat' to humanity, UN chief warns global summit. UN News. Accessed at <u>https://news.un.org/en/</u> story/2018/05/1009782

UN (United Nations), 2021. Climate Change 'Biggest Threat Modern Humans Have Ever Faced', World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation (press release). Accessed at <u>https://www. un.org/press/en/2021/sc14445.doc.htm</u>

Watts, J., 2020. One billion people will live in insulerable heat within 50 years – study. *The Guardian*, 5 May.

WEF (World Economic Forum), 2021. Global Risks Report 2021. Accessed at <u>https://www.weforum.org/reports/theglobal-risks-report-2021</u>

Xu, C. et al., 2020. Future of human climate niche. Proceedings of the National Academy of Sciences, 177, 11350-11355. <u>https://doi.org/10.1073/pnas.1910114117</u>

Utrecht University, 2019. Water towers of the world ranked on vulnerability. Accessed at <u>https://www.</u> <u>mountainresearchinitiative.org/news-page-all/112-</u> <u>global-news/2438-water-towers-of-the-world-anked-on-</u> <u>vulnerability</u>

Wallis, J.L., 2021. The risks of escalating strategic competition in the Pacific Islands. Interpreter, 21 June 2021. Accessed at <u>https://www.lowyinstitute.org/the-interpreter/risks-escalating-strategic-competition-pacific-islands</u>

Worldbank, 2021. Water Security Diagnostic Initiative. Accessed at <u>https://www.worldbank.org/en/topic/water/publication/water-security-diagnostic-initiative</u>

Yesudian, A.N., Dawson, R.J., 2020. Global analysis of sea level rise risk to airports. Climate Risk Management, 31. https://doi.org/10.1016/j.crm.2020.100266 Zhang, D.D., Jim, Z.Y., Lin, G.C-S., He, Y., Wang, J., Lee, H.F., 2006. Climatic Change, Wars and Dynastic Cycles in China Over the Last Millennium. Climatic Change 76. 3:459-477. <u>https://DOI.org/10.1007/s10584-005-9024-z</u>

Zhou, J., 2017. National Climate-Related Security Policies of the Permanent Member States of the United Nations Security Council. SIPRI. Accessed at <u>https://www.sipri.org/</u> <u>sites/default/files/2018-03/p5_climate_security_wp.pdf</u>

Image credits

Cover image: (Top) View from HMAS Adelaide arriving in Eden, 5 January 2020. Mike Gordon. Twitter @guggajugs. (Bottom left) Brisbane River flood January 2011 - Aerial view of a residential area in the suburbs of Milton during the great Brisbane flood of 2011. By Brisbane. Shutterstock. (Bottom right) Abaiang atoll, Kiribati. Simon Bradshaw.

Page 5 - Figure 1: Sydney Australia, 10 December 2019. Ferry heading to Sydney's Circular Quay in thick bushfire smoke. MW Hunt. Shutterstock.

Page 7 - Figure 2: View from HMAS Adelaide arriving in Eden, 5 January 2020. Mike Gordon. Twitter @guggajugs.

Page 8 - Figure 3: Junee, NSW Australia, 5 January 2020: Australian Flag flies in a smoke filled sky as the nearby Dunn's Road Fire burns. Greg Stonham. Shutterstock.

Page 9 - Figure 4: Cattle during a drought, Kerry Queensland. Josh Withers. Unsplash.

Page 10 - Chapter image: Micaela Parente. Unsplash.

Page 12 - Figure 5: Ball Court - Copan Ruinas, Honduras. Simon Burchell. Wikiemedia commons. Licensed under CC-by-2.0.

Page 15 - Figure 7: Pacific Fleet assist. By Flickr user Michael D. Cole/U.S Pacific Fleet. Licensed under CC-by-2.0.

Page 16 - Figure 8: Fisherman in Vietnam. By Flickr user Stung Treng/WorldFish. Licensed under CC-by-NC-ND 2.0.

Page 18 - Chapter image: Brisbane River flood January 2011 - Aerial view of a residential area in the suburbs of Milton during the great Brisbane flood of 2011. By Brisbane. Shutterstock.

Page 19 - Figure 10: Waiting for assistance in floods, India. By Flickr user Oxfam International. Licensed under CC-by-NC-ND 2.0.

Page 19 - Figure 11: Displaced people fleeing Sindh in 2010 streamed into Balochistan in Pakistan. By Flickr User Abdul Majeed Goray. Licensed under CC-by-NC-ND 2.0.

Page 20 - Figure 12: Dry Fields, Drought in Bogor Regency. By Flickr user Danumurthi Mahendra. Licensed under CCby-2.0.

Page 20 - Figure 13: Philippines flooding hits Manilla. Cheryl Ramalho. Shutterstock.

Page 21 - Figure 14: Bleached coral in the Maldives. The Ocean Agency.

Page 23 - Figure 16: Abaiang atoll, Kiribati. Simon Bradshaw.

Page 24 - Figure 17: Alexander Tsang. Unsplash

Page 25 - Figure 18: Young asian man battles climate change and drought. Piyaset. Shutterstock.

Page 27 - Figure 20: Pixabay. User: narumi31.

Page 28 - Chapter image: Unknown Author. Wikimedia commons. Licensed under CC BY-SA.

Page 31 - Chapter image: American Public Power Association. Unsplash.

Page 37 - Figure 22: Pixabay.

Thank you for supporting the Climate Council.

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

CLIMATE COUNCIL

- facebook.com/climatecouncil
- 灯 twitter.com/climatecouncil
- info@climatecouncil.org.au
- climatecouncil.org.au

The Climate Council is a not-for-profit organisation. We rely upon donations from the public. We really appreciate your contributions.



climatecouncil.org.au/donate

