

**THE CLIMATE
CRISIS:
DEFENCE
READINESS AND
RESPONSIBILITIES**



OUR APPROACH

This Defence Assessment draws on extensive research and eight months of New Zealand and South Pacific-based discussions on climate change and security with officials from countries across the Pacific, notably member countries of the South Pacific Defence Ministers' Meeting, as well as with academics and civil society from across New Zealand and the Pacific region. In this assessment "Defence" refers to both the New Zealand Ministry of Defence and the New Zealand Defence Force.

Cover photo: NH90 landing in Nasau, Koro Island, following Tropical Cyclone Winston.

Engineers from NZ Army's 2nd Field Squadron work alongside engineers from the Republic of Fiji Military Forces in the Village of Silana, following Tropical Cyclone Winston.

Key points

- Climate change will be one of the greatest security challenges for New Zealand Defence in the coming decades. Some of the largest temperature changes will occur between New Zealand and the equator, and the risk of concurrent and more extreme weather events is increasing. Meanwhile more ice is melting in Antarctica, which will contribute to sea level rise.
- The intensifying impacts of climate change will continue to test community resilience and heighten security challenges across the culturally diverse Pacific region. Pacific Island countries are disproportionately affected, even though they only account for approximately 0.04 per cent of global greenhouse gas emissions.
- The links between climate change and conflict are indirect but demonstrable. When the effects of climate change intersect with a complex array of environmental and social issues, they can be significant contributors to both low-level and more violent conflict. Security implications can be further magnified by weak governance and corruption.
- The impacts of climate change will require more humanitarian assistance and disaster relief, stability operations, and search and rescue missions. The New Zealand Defence Force may be faced with more frequent and concurrent operational commitments, which will stretch resources and may reduce readiness for other requirements.
- Defence must do more to enhance its environmental awareness as well as play a role in efforts to curb the impacts of climate change. Sustainable changes at home and on operations will further increase the credibility of Defence within New Zealand, with South Pacific partners, and at a global level.

The Ministry of Defence leads Defence Assessments, with support from the Defence Force and other agencies. The Defence Assessment process enables Defence to identify changes in the international strategic environment and consider their possible implications for New Zealand's Defence policy, capability and ultimately funding.

The Climate Crisis: Defence readiness and responsibilities

1. In coming decades, the impacts of climate change will continue to test the security and resilience of our community, our nation, the South Pacific region and the world. Some of the largest temperature changes will occur between New Zealand and the equator, and the risk of concurrent and more extreme weather events is increasing.
 - Climate change will exacerbate water shortages, food insecurity, and impact public health—further challenging areas with limited resources or weak governance.
 - The effects of climate change will challenge the preparedness level of Defence in terms of responding to events in our region.
 - Understanding and accounting for the security impacts of climate change will be a critical component of operational planning in the years to come.

“The impacts of climate change are being felt acutely in the Pacific as well as in New Zealand itself. This will necessitate more humanitarian assistance and disaster relief and stability operations in our region... New Zealand may be faced with concurrent operational commitments, which could stretch resources and reduce readiness for other requirements.”

Strategic Defence Policy Statement 2018, paragraph 151.1

Climate change in the South Pacific, Antarctica and New Zealand

2. At the 2018 Pacific Islands Forum, leaders affirmed that “climate change presents the single greatest threat to the livelihood, security and wellbeing of Pacific people”. The current effects of climate change in the region, let alone the future intensity increase, demonstrate the salience of this declaration.
3. Climate science also supports this statement—the October 2018 report of the Intergovernmental Panel on Climate Change (IPCC) notes that without “unprecedented” changes to energy systems, land management and transportation, global warming is likely to reach 1.5°C above pre-industrial levels between 2030 and 2052. The implications of the world warming to this 1.5°C mark are grave, but considerably less severe than if warming above pre-industrial levels reaches 2°C or 3°C—a real possibility without ambitious global action for change.
4. Pacific Island countries are disproportionately affected, even though they only account for approximately 0.04 per cent of global greenhouse gas emissions. The region is facing dramatic climate effects stemming from rising temperatures, including sea level rise, increased frequency and intensity of extreme weather events such as storm surges, increased intensity of tropical cyclones, more variable rainfall patterns and prolonged droughts. The implications of these effects include a range of environmental impacts, such as coral bleaching, decreasing fish stocks and increased soil salinisation—all of which have flow-on economic, cultural and social consequences.
5. For some Pacific Island countries, the threats posed by climate change are extreme. Across the Pacific, at least eight low-lying islands have already been immersed by rising sea levels.¹ The western Pacific Ocean is rising at about three times the global average rate of around three millimetres annually. Islands not fully immersed still face a range of challenges including infrastructure damage and degradation, and unproductive land, challenging the water and food security of communities.

“Climate-related risks to health, livelihoods, food security, water supply, human security and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C.”

Intergovernmental Panel on Climate Change special report ‘Global Warming of 1.5°C’, October 2018



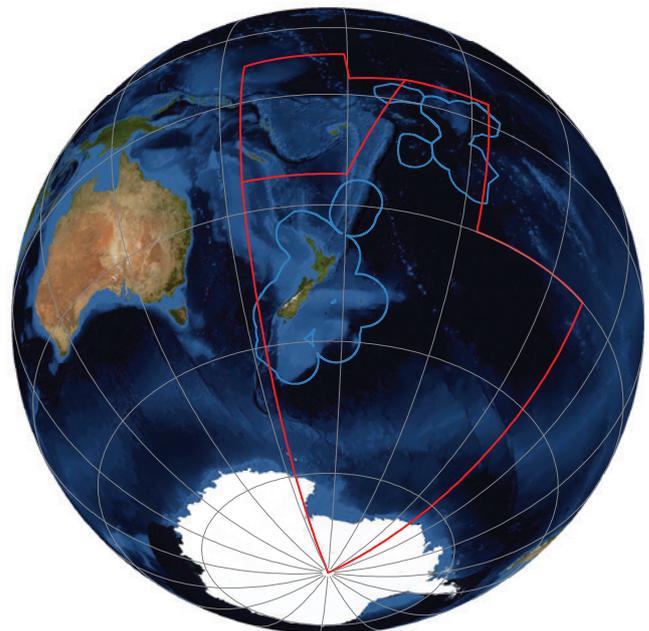
View from the Royal New Zealand Air Force C130 Hercules cockpit flying over Penrhyn, Cook Islands during Exercise Tropic Twilight 15.

¹ These low-lying islands are in Micronesia and the Solomon Islands.

6. The Pacific Ocean is warming and increasing in acidity, while surface waters of the Southern Ocean have warmed and become less saline. This is changing and degrading aquatic ecosystems, which affects fish stocks. When combined with over-fishing, changing fish migration patterns will see more vessels fishing in new areas including international waters and waters in New Zealand's expansive search and rescue area.
7. Although research on climate change in Antarctica is limited, there is strong evidence that climate change has already had an impact on the continent. Antarctic ice melt is increasing, and New Zealand Defence Force personnel have observed the thinning and retreating of ice on the continent in recent decades. Research published in December 2017 indicates the possibility of more warming of the continent, noting that increased El Niño conditions in the tropical Pacific may bring warming to western portions of East Antarctica.² Enhanced warming of Antarctica over time will contribute to sea level rise, further increasing risks for coastal communities in the Pacific.
8. New Zealand will also continue to be impacted by the intensifying effects of climate change, which will occur to differing degrees around the country and will adversely affect critical infrastructure. Estimates put five airports, 46 kilometres of rail, 2,121 kilometres of road and 43,680 residential buildings at risk from a sea level rise of 1.5 metres or less.³ New Zealand's Ministry for the Environment has forecast the following impacts are likely to occur in New Zealand before the end of this century, based on the latest climate projections:
 - Higher temperatures, with greater increases in the North Island than the South Island, and the greatest warming in the northeast (although the amount of warming in New Zealand is likely to be lower than the global average);
 - Rising sea levels, affecting coastal infrastructure and communities;
 - More frequent extreme weather events, such as droughts (especially in the east of New Zealand) and floods; and
 - A change in rainfall patterns, with increased summer rainfall in the north and east of the North Island and increased winter rainfall in many parts of the South Island.

² Clem, K. R., Renwick, J. A., & McGregor, J. (2018). Autumn cooling of western East Antarctica linked to the tropical Pacific. *Journal of Geographical Research: Atmospheres*, 123, 89-107. <https://doi.org/10.1002/2017JD027435>

³ Figure 4 of *Preparing for Coastal Change. A Summary of Coastal Hazards and Climate Change Guidance for Local Government* (Ministry for the Environment, December 2017).



New Zealand Search and Rescue Region, including areas where New Zealand is often called upon to assist

Economic Zone of New Zealand Territories and Associated States

Enhanced ice shelf melting

A 2018 study published in *Science Advances* demonstrates that as the melting of ice increases, fresh water flows into the ocean and interrupts the buoyancy effect caused by the cooler and saltier surface waters around Antarctica, which usually cause surface waters to sink to the sea floor. Fresh water from melting ice can slow down the vertical mixing of the ocean, inhibiting the cold surface water from sinking. This allows the deeper waters to retain their heat and melt the ice from below.

Silvano *et al.*, *Sci. Adv.* 2018; 4: eaap9467
18 April 2018



Engineers from New Zealand Army's 2nd Field Squadron work alongside engineers from the Republic of Fiji Military Forces in the Village of Silana, following Tropical Cyclone Winston.

The intersection of climate change and security

- The links between climate change and security are indirect but demonstrable. When the effects of climate change intersect with a complex array of environmental and social issues, they can be a significant contributor to both low-level and more violent conflict. The security implications of climate change are further magnified in areas dealing with weak governance or corruption. The ways climate change is affecting the Pacific region, and the pace and magnitude of the impacts, have drawn leaders in the region to consider climate change as a threat in its own right.

Security impacts of climate change

Climate effects

- Rising temperatures
- Melting ice
- Sea level rise
- Ocean acidification
- Intensifying cyclones
- More or less rainfall
- Floods / droughts
- Heatwaves

Environmental impacts

- Coral bleaching
- Decreasing fish stocks and marine life
- Coastal erosion
- Increase in soil salinity
- Unproductive land (non cultivable and eventually uninhabitable land)

Social impacts*

- Loss of livelihood
- Water and food scarcity
- Increase in malnutrition
- Loss of jobs / education opportunities
- Loss of cultural identity
- Damage to community infrastructure
- Climate migration

Security implications

- Human security challenges
- Health-related crises
- Resource competition (food and water security)
- Violence from mismanaged adaptation or migration
- Land disputes

Magnified by weak governance

The impacts of climate change will become more pronounced as time goes on

*Social Impacts are often interconnected with economic and political factors



A Medium Heavy Operational Vehicle (MHOV), loaded with food aid and shelter boxes, is driven off a Landing Craft at a beach on Vanua Balavu Island in Fiji, following Tropical Cyclone Winston.

10. Globally, climate change is most acutely affecting states less equipped to respond at pace, including in the Pacific region. Pacific communities hold important local and indigenous knowledge that can enable climate change mitigation and adaptation, which works to increase local resilience. The persistent nature of climate change and the flow on social, economic and health implications of increasingly intense environmental changes are, however, challenging communities across the region. Reducing arable land and depleting fresh water supplies are adversely affecting community health. The impacts can cause added stress to communities in post-conflict environments, including in the Autonomous Region of Bougainville and the Solomon Islands.
11. Many Pacific peoples have expressed their desire to remain on their land as long as possible, but some communities have already had to relocate and more climate-induced migration is inevitable. Climate migration has already caused some community-level conflict within the Pacific. Across the region, there have been instances of communities being split up for relocation, some being moved to areas with different cultures without prior consultation with the host communities, and others being moved into already crowded areas. In such cases, there have been reports of low-level conflict over land—sometimes deadly—and reports of increased levels of violence, including against women and children. When not well managed, climate migration has the potential to heighten security concerns, in the Pacific and extending into both maritime Southeast Asia and South Asia.
12. Politics at the local, state and international levels all play roles in either alleviating community stress exacerbated by the impacts of climate change or heightening tensions. The President of the International Committee of the Red Cross, Peter Maurer, recently noted that climate change has forced humanitarian organisations to go “far beyond just handouts” in their attempts to prevent conflict. He added that “there is a perfect storm building up between climate change and the development of violence which is of concern for us...”⁴ The work of organisations such as the Red Cross, especially in more remote places across the Pacific, will remain important to support community leaders who are sometimes the more immediate providers of governance in place of the state.
13. Against this background, there is a clear requirement to advance national and international discussions across the region on the links between climate change and security. Climate change and conflict are more readily explored in discussions and academic research in relation to the Middle East and Africa than the Pacific. Globally, disagreements in relation to climate change—such as in relation to the Paris Agreement—could influence broader relationships between states as well as affect collective responses. Some states could look to use assistance in climate change disaster adaptation, mitigation, response, and recovery as a way to increase influence and access. Working with Pacific Island countries on climate change, including in the security sphere, is an opportunity to learn lessons from each other while further strengthening strategic partnerships.

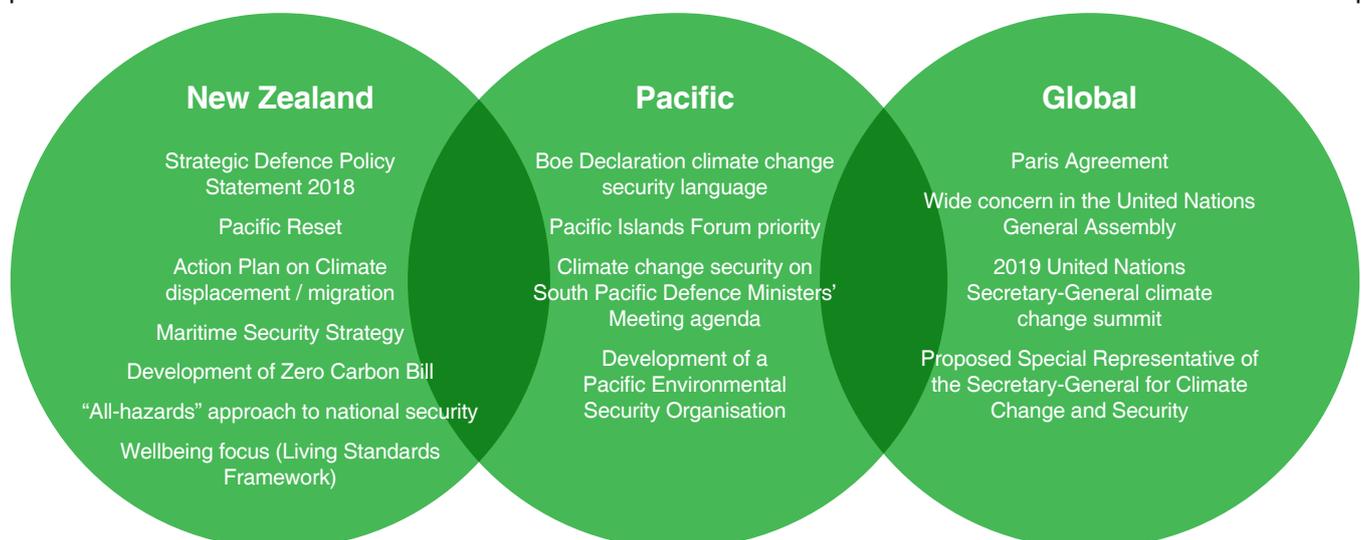
⁴ Sachdeva, S. ‘Perfect storm’ of climate change and growing conflict. (newsroom, 4 October 2018). <https://www.newsroom.co.nz/2018/10/23/288944/climate-change-growing-conflict-create-perfect-storm>

Opportunities working in an evolving policy context

14. The Strategic Defence Policy Statement 2018, the New Zealand Action Plan on Climate Change-related Displacement and Migration, the Pacific Islands Forum's Boe Declaration and the Paris Agreement are some of the range of policy-related initiatives in New Zealand, the Pacific and on the global stage that support an expanded concept of security that is more inclusive of human and environmental security. Further, protecting the natural environment by contributing to the preservation and stewardship of New Zealand's natural and physical environment is one of New Zealand's seven overarching national security objectives.
15. The New Zealand Government already has a work programme under way to help alleviate the effects of climate change. This includes re-energised Pacific policy settings, supported by the Pacific Reset, the development of a Zero Carbon Bill and the commitment to make 100 per cent of New Zealand's electricity renewable by 2035. In this context, Defence has an opportunity to be better prepared to address the adverse impacts of climate change in New Zealand and its neighbourhood and to be ambitious in becoming more environmentally sustainable. This would contribute to the Government's wider efforts to help lead the global policy debate on addressing and minimising the impacts of climate change.

Wider Policy context

Expanded concept of security, with human and environmental security



Implications for New Zealand Defence

16. With current warming rates, links between climate change and security are on course to intensify, and militaries around the world will need to start preparing to operate more often in response, working alongside governmental and non-governmental agencies. The effects of climate change are challenging countries and regions in different ways: forces will be stretched with a growing number of tasks in response to climate-induced impacts globally.
17. As outlined in the Strategic Defence Policy Statement 2018, more humanitarian assistance and disaster relief and stability operations in our region will be required due to the impacts of climate change, including rising temperatures, increased frequency and intensity of extreme weather events such as storm surges, increased intensity of tropical cyclones, more variable rainfall patterns and prolonged droughts. Local communities and response agencies alike should prepare for larger scale disasters, shorter recovery periods between disasters, and the possibility of communities' reduced resilience.
18. The environmental impacts of climate change on the ocean and marine life, particularly in the Pacific and in the Southern Ocean, could see fishing vessels operating in new areas, including in international waters and New Zealand's expansive search and rescue area of responsibility in the coming years. Maritime domain awareness will be increasingly important in helping to assess how climate change is affecting other regional security trends, such as illegal, unreported and unregulated fishing. Ongoing work will be crucial with Five-Eyes partners, along with partners in South America, Southeast Asia and the Pacific to increase New Zealand's understanding in this area.
19. With the intensifying impacts of climate change intersecting with other challenges, New Zealand may be faced with increasingly concurrent operational commitments, which could stretch resources and reduce readiness for other requirements. As well as climate change causing increasingly severe weather events, New Zealand and the Asia-Pacific region deal with a number of other natural disasters each year, including volcanic eruptions and earthquakes. The possibility of multiple events occurring in a short timeframe, impacting on increasingly vulnerable communities, would stretch defence forces and other responders not only in New Zealand, but across the region.
20. Given the importance afforded to climate change by our Pacific partners and the New Zealand Government's re-energised approach to the Pacific, more will be expected of Defence in terms of being prepared to respond to this security challenge. There is a need to increase knowledge on climate change and environmental sustainability across Defence, and for Defence to be more active in the Pacific to both assist and learn from regional counterparts. There is also an opportunity for Defence to step up sharing with the public how it is already making and working towards more sustainable choices and policies.



HMNZS Wellington patrols the Southern Ocean.

Defence support to climate research

The Defence Force already supports a number of climate change research initiatives, with a particular focus on the Southern Ocean:

In 2016, as part of the Deep South Challenge, HMNZS Wellington was fitted with equipment that measured aerosols above the Ross Sea, and made the first upward-looking measurements of cloud heights.

The placement of a buoy by the Royal New Zealand Navy provides data to help organisations, including NIWA, better understand Southern Ocean wave dynamics.

The Defence Force will support the Antarctic Science Platform to measure carbon dioxide levels in Southern Ocean surface air.

Improving Defence's climate change readiness and meeting our responsibilities

21. The impacts of climate change will have enduring implications for New Zealand Defence and close partners, especially in the Pacific.
22. These high-level recommendations sit in the context of ongoing work around capability and affordability, and will be followed by a joint Ministry of Defence and New Zealand Defence Force implementation plan in 2019.
 - Defence should start planning for increasingly concurrent operational requirements in the South Pacific due to the impacts of climate change.
 - This could include updating the suite of Defence planning scenarios to enable preparation for increasing humanitarian assistance and disaster relief and stability operations as well as search and rescue in new areas due to anticipated changes to where fishing vessels operate.
 - Defence should consider how it could increase its work alongside other New Zealand and international agencies to support the efforts of South Pacific partners to adapt and build resilience against the impacts of climate change.
 - Defence should work towards gaining a better understanding of South Pacific counterparts' concerns around climate change and how it is playing out now and into the future both in their security sectors and in their broader societies.
 - Defence should seek to elevate international discussion on the security impacts of climate change, including with foreign partners in bilateral defence talks and at regional forums. This would help Defence learn from others, highlight the impacts on the South Pacific, and emphasise the importance of improving resilience in the region.
 - Defence should explore opportunities to support scientific research on climate change and security (or conflict) in the South Pacific and on how climate change will affect the way the Defence Force should operate in the Southern Ocean and Antarctica.
23. As part of a broader New Zealand Government effort to address climate change, the Defence Force has an opportunity to be a more environmentally aware agency. This would also help bolster the standing of the Defence Force in the South Pacific region, where climate change is seen as a top security threat.
 - The Defence Force should invest more in research relating to science and technological developments around "green" or more sustainable military technology, particularly in relation to different types of fuels, energy storage and renewable energy.
 - Defence should seek lessons learned from like-minded and close foreign partners on integrating climate change planning and environmental security into business as usual activities.
 - The Defence Force should work with international partners to implement best practices on operations to mitigate environmental impacts that could affect local communities.
 - Defence should continue to look into options for being more sustainable on camps and bases in New Zealand that could be swiftly implemented as well as more ambitious options to be considered in future.
24. Noting the development of the Zero Carbon Bill in New Zealand:
 - Defence should explore the addition of an environment and sustainability consideration in procurement and capability planning processes.
 - The Defence Force should continue working towards implementation of its Energy Policy, which promotes further exploration of opportunities around sustainability.
 - Following the Government's direction for transparency, the Defence Force should investigate how it could work towards reporting on its carbon emissions



Helene Quilter
Secretary of Defence



K.R. Short
Air Marshal
Chief of Defence Force



A SH-2G Sea Sprite helicopter transports a water tank from HMNZS CANTERBURY to the Lamén Bay school on Epi Island in Vanuatu.

