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16 August 2017

Our Reference: 17/604

Foreign Affairs, Defence and Trade References Committee
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600

Dear Chair

RE: Inquiry into the implications of climate change for Australia's national security

Thank you for the invitation to contribute to the Committee's inquiry into the implications of climate change for Australia's national security.

We wish to provide the comments below for the Committee's consideration. We provide an overview of four key areas related to climate change, which research has a role to support and which are relevant across the terms of reference of the inquiry:

- developing projections of future climate scenarios
- informing adaptation approaches
- supporting complementary adaptation and mitigation responses to climate change
- foresighting

Developing projections of future climate scenarios

Research has enabled the development of regional climate projections for Australia, the Asia-Pacific region, and the world:

- In 2014, CSIRO and the Bureau of Meteorology published climate change projections for regional and coastal Australia which are the most up-to-date, nationally consistent and comprehensive regional climate projects for Australia.¹ This builds on almost three decades of scientific research aimed at developing regional climate projections for Australia.
- In 2014, CSIRO and the Bureau of Meteorology delivered regional climate projections for the Pacific region (14 partner Pacific Island countries), including all aspects of past, present and future climatology for each country.² The PACCSAP 2015 Regional Climate Summary Report is effectively a non-technical summary for policy-makers based on the 2014 science, but is otherwise targeted at sectoral stakeholders.
- The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report has adopted four Representative Concentration Pathways to span the range of possible future trajectories in terms of resulting greenhouse gas concentrations in the atmosphere.³

¹ <http://www.climatechangeinaustralia.gov.au>

² The full report and chapters are available at: <http://www.pacificclimatechangescience.org/publications/reports/>

³ <https://www.ipcc.ch/report/ar5>

- Australia has developed its own national climate and earth system modelling capability – called ACCESS⁴ – which enables researchers to explore future climate scenarios for Australia and the likely consequences of future emissions scenarios globally and for Australia. Scenarios can also be explored by combining physical climate simulations from ACCESS (and/or from a multi-model ensemble) with economic modelling.
- CSIRO has also contributed to the development and use of standard downscaled climate projections datasets in Asia^{5, 6, 7, 8}, providing key underpinning datasets for each region on potential future change.

These authoritative datasets could be used to underpin the impacts considered in ToR (a).

Informing adaptation approaches

Successful adaptation to climate change will contribute to economic, social and political stability in Australia (and in the region – see next section below). Research can inform the development of effective climate change adaptation approaches and specific actions. CSIRO has been at the forefront of a ‘systems view’ of climate adaptation decision making which considers a range of factors including decision lifetimes, uncertainty in the drivers of change and the nature of adaptation response options. Our approaches incorporate cross-sectoral, inter-disciplinary and multi-agency information, regardless of the magnitude and nature of climate change impacts^{9, 10, 11, 12, 13, 14}. These approaches are moving the global paradigm of climate adaptation approaches from one focussing on impact analysis, which may potentially lead to a paralysis of decision making due to the vast range of potential problems that need to be considered, towards focussing on decisions that are the most significant and immediate. Our ‘risk-and-resilience’ based approaches are now being adopted as “third generation” climate adaptation planning in international development^{15, 16}.

These approaches are likely to assist thinking with respect to ToRs (b-d).

Supporting international adaptation to climate change

CSIRO has engaged in climate adaptation research partnerships with countries in the Asia-Pacific region to better understand and support the capacity of those countries to manage the potential risks and impacts of climate change¹⁷. Much of this research manifests through livelihood development aid in which the added lens of resilience at multiple levels (i.e., community to local government to national level) are specifically included; this can help to build capacity to adapt to the emerging effects of climate change on food, energy

⁴ <https://www.csiro.au/en/Research/OandA/Areas/Assessing-our-climate/CAWCR/ACCESS>

⁵ <http://wp.csiro.au/r4da/projects/long-term-projects/climate-projections-high-resolution-downscaling-for-vietnam/>

⁶ Katzfey J (2015) *High-resolution climate projections for the Philippines: Methodology*. Aspendale, Vic.: CSIRO.
<https://doi.org/10.4225/08/58542f2e2339b>

⁷ Katzfey J *et al* (2016) High-resolution simulations for Vietnam - methodology and evaluation of current climate. *Asia-Pacific Journal of Atmospheric Sciences* **52**, 91-106.

⁸ www.rccap.org

⁹ Butler J *et al* (2015) Integrating Top-Down and Bottom-Up Adaptation Planning to Build Adaptive Capacity: A Structured Learning Approach. *Coastal Management* **43**, 346-364.

¹⁰ O’Connell D *et al* (2015) *Disaster Resilience and Mitigation: A short report on current and future capacity to deliver on risk assessment and mitigation needs*. <https://research.csiro.au/eap/key-findings/>

¹¹ Stafford-Smith M *et al* (2011) Rethinking adaptation for a 4 C world. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* **369**:196-216.

¹² Siebentritt M & Stafford-Smith M (2016) *A User’s Guide to Applied Adaptation Pathways Version 1*. Seed Consulting Services and CSIRO, Australia.

¹³ Wang X, *et al* (2014) Risk assessment and decision-making for residential housing adapting to increasing storm-tide inundation due to sea-level rise in South East Queensland, Australia. *Civil Engineering and Environmental Systems* **31**:125-139.

¹⁴ Wise RM *et al* (2014) Reconceptualising adaptation to climate change as part of pathways of change and response. *Global Environmental Change* **28**:325-336.

¹⁵ Butler J *et al* (2014) Framing the application of adaptation pathways for rural livelihoods and global change in eastern Indonesian islands. *Global Environmental Change* **28**: 368-382.

¹⁶ O’Connell D *et al* (2016) *Designing projects in a rapidly changing world: Guidelines for embedding resilience, adaptation and transformation into sustainable development projects. (Version 1.0)*. Global Environment Facility, Washington, D.C.

¹⁷ <https://research.csiro.au/climate/themes/international>

and water security. The rate of climate change impacts in some countries in the region may outstrip the ability of people to adapt and so there are likely to be emerging hot-spots of change and associated vulnerability, requiring particular attention.

These approaches and experiences are likely to assist responses with respect to ToRs (b-d).

Foresighting

Foresighting approaches that consider climate change as a component of multiple, intersecting factors can be used to identify potential future scenarios affecting security, and appropriate adaptation responses in a global, sector and local/regional context. For example:

- The CSIRO "Our Future World" report¹⁸ identified a series of global mega-trends and future global scenarios, including potential climate change impacts.
- In a sector context, foresighting approaches have been used to identify potential mega-trends and mega-shocks for Australia's biosecurity sector¹⁹, including potential impacts of climate change.
- Foresighting approaches can also be used in local and regional contexts to identify appropriate adaptation responses to multiple, intersecting factors such as climate change, sea level rise and extreme events, population growth and density, resource condition, infrastructure quality and quantity, governance and political context.²⁰
- CSIRO has been developing models for more holistic quantitative foresighting such as the Australian National Outlook^{21, 22}. While these have mainly been deployed for Australian futures²¹, they can also be applied at regional and global scales²² to assist in collaboratively mitigating the underpinning drivers of security concerns.

These approaches may be particularly relevant to ToR (a), as well as informing foresight responses to (b-e).

We wish to also refer the Committee to a separate submission that we are preparing as input to the Senate Environment and Communications References Committee's current inquiry into current and future impacts on housing, buildings and infrastructure, which provides more detail on many of the matters raised above. We would be happy to provide a copy of that document to you once submitted.

We would be pleased to elaborate on any of the points raised above or provide additional details if needed.

Yours sincerely

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¹⁸ Hajkowicz S *et al* (2012) Our Future World: global megatrends that will change the way we live. 2012 Revision. CSIRO, Australia.

¹⁹ Simpson M & Srinivasan V (2014) Australia's Biosecurity Future: preparing for future biological challenges, CSIRO, Australia.

²⁰ Butler JRA *et al* (2014) Declining ecosystem service trajectories in Milne Bay, Papua New Guinea: is human population pressure a more critical driver than climate change? *Marine Policy* **46**:1-13.

²¹ Hatfield-Dodds S *et al* (2015) Australia is 'free to choose' economic growth and falling environmental pressures. *Nature* **527**, 49-53 and Hatfield-Dodds S *et al* (2015) *Australian National Outlook 2015: Economic activity, resource use, environmental performance and living standards, 1970-2050*. CSIRO, Canberra.

²² Hatfield-Dodds, S *et al* (2017) Assessing global resource use and greenhouse emissions to 2050, with ambitious resource efficiency and climate mitigation policies. *Journal of Cleaner Production* **144**, 403-414.