



Developing a new climate change action plan for Tasmania

CSIRO Submission to the Tasmanian Climate Change Office

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1 Background

1.1 Introduction

The interconnected nature of climate and the environment, and our social and economic systems, means that an integrated approach to both mitigation and adaptation is critical to providing effective solutions. CSIRO has this interdisciplinary capability and has applied it to deliver solutions across government, industry, and civil society.

CSIRO delivers a broad suite of research relevant to the identification of climate impacts, preparation of vulnerability assessments, and development of climate change action plans¹. For example, CSIRO has developed regional climate change projections, products and services that are critical for informing climate adaptation (and mitigation) strategies in Australia and our region. Our regional climate projections draw on comprehensive state of the art modelling at multiple scales, together with the latest science on climate processes, evaluation of model performance, and knowledge of past trends. These projections have been used to develop decision-support tools, guidance material, and datasets in response to the needs of next- and end-users. In turn, these tools have assisted users to make the most appropriate use of these projections for climate risk assessment and adaptation planning.

Our world-leading weather, climate and earth simulation capability² is also being used to predict and mitigate economic, environmental and social losses from extreme events³ (droughts, atmospheric and marine heatwaves, fires, cyclones, dust storms, air pollution and floods), as well as supporting emergency responses within Australia⁴.

Application of our climate science to the challenges of food security has assisted primary producers, fishers and aquaculture industries to adapt fishing, farming and management approaches to a changing climate, and safeguard the value of Australia's farming and seafood sector^{5,6}.

Managers of Australia's coastal and marine resources have benefited from our interdisciplinary research that supports sustainable multiple-use management in complex socio-ecological systems that are changing as a result of climate change⁷.

CSIRO has deep and enduring relationships with key partners across Australia's innovation system and internationally. CSIRO would welcome further discussion with relevant representatives from the Tasmanian Climate Change Office where it is identified that our expertise and collaborative

¹ Climate Adaptation (csiro.au)

² <https://www.csiro.au/en/research/environmental-impacts/climate-change/access>

³ <https://www.csiro.au/en/news/News-releases/2019/Climate-change-leaves-mark-on-coastal-ecosystems>

⁴ <https://www.csiro.au/en/research/natural-disasters>

⁵ <https://www.csiro.au/en/work-with-us/industries/agriculture/Food-security-and-global-farming>

⁶ <https://www.csiro.au/en/research/animals/Aquaculture>

⁷ <https://www.csiro.au/en/research/natural-environment/oceans/Marine-climate-responses>

networks may contribute to the development of a robust updated Climate Change Action Plan for Tasmania.

1.2 Purpose of this submission

This submission has been prepared in response to the public consultation on the “Developing and New Climate Change Action Plan for Tasmania Opportunities Paper 2021” released by the Tasmanian Climate Change Office.

In this submission CSIRO provides advice based on our science that is underway or that we have completed. The submission recaps the benefits of helping Tasmania adapt to climate change, and then addresses a selection of the six priorities relative to the following of ‘Key Question’ : *What do you think are the key opportunities to help Tasmania adapt to a changing climate?*

2 The Tasmanian context

Tasmania is highly exposed to the impacts of climate change. Tasmania is in a global hotspot for ocean warming (Hobday and Pecl 2014, Oliver et al 2021), and in recent years has experienced the effects of the types of extreme events associated with climate change – drought, bushfire, marine heatwaves and damaging storms – that have significant impacts on Tasmania’s unique environments, communities and economy (Eslake 2016, Bergstrom et al 2021). Tasmania is also a desirable location, with people moving south to escape hotter temperatures on the mainland (Osbaldiston et al 2020), and a refuge for a range of marine species moving south with warmer waters off our coastlines – some of which have caused significant damage to marine ecosystems and dependent fisheries (Cresswell et al 2019).

Research has shown that in the marine domain, industries such as fisheries and aquaculture are vulnerable to the changes accompanying warming waters, and this evidence has been summarised elsewhere (Pecl et al. 2019). On land, forestry and mining are also vulnerable to climate impacts with observed negative outcomes over the past twenty years such that adaptation is now important (Hodgkinson et al. 2014).

These environmental, economic and societal effects will only increase into the future (IPCC 2019) and the development of Tasmania’s new Climate Action Plan offers an opportunity for Tasmania to be prepared to respond to the challenges presented by climate change.

2.1 The opportunity for Tasmania

The scientific expertise in Tasmania is world-leading, particularly with regard to marine science, agriculture and forestry and is well connected across the Australian and international science community. The impacts of climate change are well understood in our oceans and landscapes as a result of almost two decades of work by scientists (e.g. Ling and Hobday 2018). Climate adaptation science has also been world-leading, including development of climate downscaling (see Climate Futures Tasmania⁸), forecasting⁹, adaptation pathways¹⁰ and decision support tools¹¹. Tasmania can do more to connect these strengths in science and innovation to develop actions on climate change mitigation and adaptation.

Tasmanians have many opportunities via adaptation to manage the undesirable impacts of climate change. The state has smaller communities, responsive primary industries and technology expertise that make for easier collaboration between science-industry-society than elsewhere in the world. CSIRO’s research has shown these connections influence the level of adaptation preparedness (Lyth et al 2016), and the demonstrated progress for fisheries (Frusher et al 2014). CSIRO has also shown that there is a disconnect between bottom-up approaches, implemented by

⁸ <https://climatefutures.org.au/>

⁹ <https://research.csiro.au/mri-research-portfolio/home/climate-impacts-adaptation/marine-heatwaves/forecasting-marine-heatwaves/>

¹⁰ <https://research.csiro.au/teps/current-activities/flatbackfutures/>

¹¹ <https://www.csiro.au/en/research/natural-environment/oceans/Marine-climate-responses>

individuals and communities, and top-down approaches from government (Pecl et al 2019). This disconnect has the potential to confound attempts for greater progress.

The brand and image promoted of Tasmania by the state government, industry and others is based on Tasmania's relatively pristine natural environment, and lighter human footprint. Tasmania can play a leading role in Australia, and internationally, by exploiting its natural advantage in capacity and community in setting precedents that reduce the impacts, advantage the economy, and enhance the standard of living enjoyed by most Tasmanians.

Tasmania can play a unique leadership role – and the new *Climate Action Plan* provides the opportunity to support the delivery of this role through articulation of a shared vision for government and community. This will see government set the strategy and provide a unified and aspirational vision that links top-down and bottom-up adaptation plans and actions.

2.2 Pathways to success link both mitigation and adaptation strategies

The interconnected nature of climate and Tasmania's economic system means that integrated approaches to both mitigation and adaptation should be considered. In the context of Tasmania's greenhouse gas emissions profile¹², CSIRO suggests that focusing action in each of the major emitting sectors (energy, industrial processes, agriculture, waste and transport) could achieve substantial reductions. Failure to achieve progress in any single sector will likely make it more challenging to meet long term emissions reduction targets.

Some climate change is inevitable (even if emissions targets are met) and will require ongoing adaptation for Tasmania¹³. Tasmania is already exposed to climate impacts from fire, coastal erosion, heatwaves (on land and in the ocean), species migrations, drought, floods, and dust storms. The risks from this exposure can be reduced, but will require dedicated effort to understand, monitor, and predict climate hazards and their impacts. Generation of this information is best served through targeted partnerships (codesign) between science agencies and the state and local agencies, industries, and groups engaged in climate adaptation. Tasmania has an opportunity to innovate and lead because of the close proximity of the key science and agency partners. The realisation and benefit of these partnerships is likely to require strong support and facilitation.

A key part of establishing a future pathway can be to articulate what 'success' might look like for adaptation and mitigation in Tasmania, sometime (or at several points in time) into the future. Visioning and foresighting (e.g. Nash et al 2021) activities through engagement of community and industry could help to articulate the vision of future success, and could build on existing examples of engagement that centre on Tasmanians and their views of the risks and opportunities that climate change presents (e.g. Kelly et al. 2020). Identifying a vision for the future can then help identify key steps or milestones along a pathway of actions towards that future, and so help in

¹² http://www.dpac.tas.gov.au/divisions/climatechange/climate_change_in_tasmania/tasmanias_emissions

¹³ IPCC data reproduced by Tas PM&C Department of Premier and Cabinet (dpac.tas.gov.au)

setting smart, measurable, achievable targets (e.g. CSIRO, 2018). These targets, in turn, would be supported by a system of measures, reporting and indicators.

3 Focus Areas

Since the 2017-21 Climate Action Plan was published, scientific understanding and focus has improved knowledge in some areas and exposed the need for additional attention in others. In the following section we note key information and needs from a scientific perspective for selected priority areas that may be useful in developing the next Action Plan, relative to the question: *What do you think are the key opportunities to help Tasmania adapt to a changing climate?*

3.1 Understanding Tasmania's Future Climate (Priority 1)

Tasmania has solid research on climate change decades ahead provided through the Climate Futures program¹⁴. A key missing piece now evident is the need to understand variability and extremes of the near-term Tasmanian climate (2021-2030). Our research shows that the impacts of climate change will be primarily felt through more frequent and intense extreme events. This means that adaptation efforts for Tasmania need to be geared around the best available information on the likelihoods of relevant extremes over coming years. CSIRO is working in partnership with the Bureau of Meteorology to provide forecasts and scenarios of near-term climate hazards on land and in the ocean. To realise the benefit of this information for Tasmania requires:

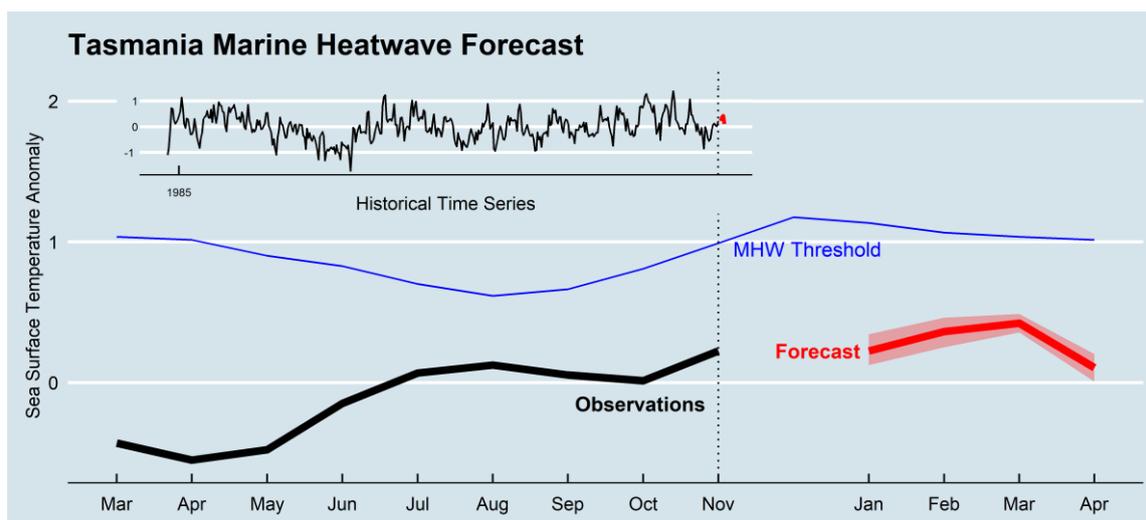
- Dedicated partnerships to ensure that climate hazard information is generated for Tasmania on the scales that matter to Tasmanian government and industry
- Codesign between science agencies and stakeholders of climate hazards products so that they are fit for purpose for Tasmanian adaptation
- Programs to identify, monitor, evaluate, and ultimately forecast, key climate hazard indicators for climate adaptation in Tasmania
- Analysis to determine the frequency of co-occurrence of extreme events (e.g. flood followed by fire, storms and heatwaves).

For example, work on marine heatwaves has shown an increase in frequency, duration and intensity off the east coast of Tasmania (Oliver et al. 2018). These events offer a window into future conditions, and CSIRO efforts to develop a prediction system led to the first seasonal prediction for east coast Tasmania for 2021¹⁵. Additional efforts are needed to tune these forecasts for use by marine stakeholders, and to develop other short-term forecast products that can be used to reduce climate risk.

¹⁴ <https://climatefutures.org.au/>

¹⁵ <https://research.csiro.au/mri-research-portfolio/home/climate-impacts-adaptation/marine-heatwaves/forecasting-marine-heatwaves/>

Figure 1 – Tasmania Marine Heatwave Forecast from CSIRO (December 2020) for the period Jan-April 2021



3.2 Advancing our renewal energy capability (Priority 2)

Nil response.

3.3 Reducing our transport emissions (Priority 3)

Nil response.

3.4 Growing a climate-ready economy (Priority 4)

A climate-ready economy will be prepared for both incremental and transformational adaptation. Sectors and individual businesses will understand their climate exposure, risk tolerance, and adaptation options. The Tasmanian economy will understand the role of national and international trends in markets, consumer preferences, and policy drivers. Some sectors will transition to new approaches, and additional business sectors may arise in the future.

- Adaptation of the economy will require bottom-up and top-down actions to prepare Tasmania for the climate of the future. In addition to providing a policy environment that supports adaptation, pilot projects may be needed across the range of vulnerable communities, industries and environments.
- Marine carbon markets offer an opportunity for Tasmania. The potential Tasmanian contribution to Blue Carbon through marine algae and saltmarshes is less well understood compared to the potential for mangrove and seagrass contributions elsewhere in Australia. Studies to determine this potential may see new business opportunities in future.

3.5 Building climate resilience (Priority 5)

While building resilience has been recognised as a coping strategy in response to climate change (Adger 2006), the magnitude of change that is coming to Tasmania suggests that transformation could be part of an adaptation strategy (Park et al 2012). For example, declines in some marine

species that currently support fisheries will require transformation of fisheries to access new species, or development of alternative practices such as stock enhancement or grow-out (Creighton et al 2016). CSIRO has expertise to offer here:

- CSIRO is a leading contributor to the knowledge base of building climate resilience, and disaster resilience, in Australia. We're providing scientific knowledge to equip policy makers, industries, and a range of communities, with practical and effective adaptation options to respond to climate change and variability. Our report on Climate and Disaster Resilience¹⁶ highlights many opportunities and recommendations at the national scale which are applicable to the Tasmanian context and scale. These include understanding threat and vulnerability (see following point), and how to better prepare, respond and recover from disasters.
- CSIRO helps build understanding of vulnerability, such as from the impacts of climate change, to inform investment and preparation decisions. We help government and businesses get ready for a changing climate by understanding the rapid cascade of impacts across interconnected systems for food, water, energy, transport, communications, and more. See more at the Australian Vulnerability Profile¹⁷.
- CSIRO also develops tools, such as the Resilience, Adaptation Pathways and Transformation Approach (RAPTA)¹⁸, that incorporate concepts of resilience assessment with adaptation planning to provide practical guidance to policy makers, farmers, planners, project managers and researchers on how to identify and implement robust interventions in systems to move towards sustainability. It will be critical to consider cumulative impacts and compounding risk when developing adaptation strategies.

3.6 Supporting community action (Priority 6)

It will remain critical to build partnerships that link top-down government and bottom-up community efforts in adaptation. Tasmanians are interested in and concerned about climate change and have a high level of willingness to engage in 'climate conversations' (Kelly et al 2020). Bringing community, industry and other stakeholders into discussions about Tasmania's climate future – and using approaches such as foresighting (e.g. Nash et al 2021) to help develop shared visions about that future – is a constructive means of developing pathways of actions for adaptation and mitigation.

CSIRO could support these efforts in community engagement, for example:

- CSIRO research supports industry and community action in tackling climate through reducing emissions, energy use and waste, particularly in cities and urban areas and through the development of circular economies and managing waste.

¹⁶ <https://www.csiro.au/-/media/Environment/CSIRO-Report-Climate-and-Disaster-Resilience-Overview.pdf>

¹⁷ <https://research.csiro.au/eap/australian-vulnerability-profile/>

¹⁸ <https://research.csiro.au/eap/rapta/>

- CSIRO has experience working with the agricultural sector, regional communities and policy-makers to address the national challenge of more frequent and severe drought cycles across Australia and seeks to collaborate with a broad community of aligned partners to improve drought resilience and future proof regional communities.

3.7 Priorities not covered in the above

Tasmania has the potential to play a role in developing both nature-based (e.g. blue carbon) and engineered solutions to carbon dioxide removal supporting the transition to net zero emissions. These opportunities are nascent but are likely to play an increasingly important role in delivering solutions for limiting climate change.

4 Summary

CSIRO has capabilities and experience in many disciplinary areas including digital platforms, climate change modelling, industry profitability, community resilience, could be harnessed to assist the development of a new Climate Action Plan for Tasmania. As Australia's National science agency, CSIRO is well placed to deliver the underpinning science to inform evidence-based responses for climate change adaptation.

Our well developed and comprehensive network of research partners across Australia's innovation system and internationally could be applied to leverage the best available research to assist the scoping of a roadmap for delivery of the most effective and efficient solutions.

As part of considering the recommendations provided above, a Climate Plan should have clear and measurable targets, and accountability for transparent and regular reporting on performance against them. CSIRO has developed impact planning tools, monitoring and evaluation strategies, and dashboards that can be used to aid these needs.

CSIRO would welcome further discussion with relevant representatives from the Tasmanian Climate Change Office where it is identified that our expertise may contribute to the development of a robust Climate Change Action Plan for Tasmania.

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