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Priorities for national coastal adaptation action

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The Australian Coastal Society welcomes the National Climate Risk Assessment (NCRA) and the National Adaptation Plan (NAP). We agree with recognition in these documents that climate change risks to coastal communities and settlements are a matter of national priority, and that further adaptation action is required. The Australian Coastal Society has long-standing expertise relevant to effective coastal adaptation across its strong professional, research and coastal management practitioner membership (<https://australiancoastsociety.org.au/>).

Commitment to ongoing steps in enabling coastal adaptation is important as risks are large-scale and increasing and directly impact on places that are of vital importance to the Australian economy and lifestyle values. However, NCRA risk assessment for the coasts only partially addresses known coastal risks, and there is clear evidence of gaps in adaptive capacity and implementation concerning coastal adaptation, along with weaknesses in current national adaptation governance.

The purpose of this correspondence is to share the Australian Coastal Society's considered views on priorities for national coastal adaptation action in the near future. In addition, the Australian Coastal Society has received important feedback on methods employed to assess coastal risk in the NCRA, and advice on important areas of analytic capacity that need development for future risk assessment. We are in a position to provide more technical commentary on methods used in the NCRA to the Department to build more robust national capability and enable wider consistent application of hazard data across jurisdictions.

Priorities for national coastal adaptation action

The Australian Coastal Society considers that there are four key areas where near-term action is needed to enable national coastal adaptation:

1. Estuaries – a partnership is urgently needed to constrain risks

Many estuaries in Australia are warming and acidifying at a rate an order of magnitude faster than predicted by global ocean and atmospheric models; data from the open coast cannot be used to assess risks to estuaries (Scanes et al., 2020¹). Estuaries are where the large majority of development in the coastal zone occurs, as well as nationally significant ecosystems including Ramsar sites. Climate change impacts on estuaries are already apparent and, in the future, will be an order of magnitude greater than the open coast (identified in the 2009 First Pass *Climate Change Risk to Australia's Coast* undertaken by the then Dept. of Climate Change). We know that development is continuing in exposed populated estuarine areas with potential for adverse impacts on vulnerable peoples, housing, commercial entities and significant public infrastructure (e.g., ports, airports, stormwater drainage). These risks remain to be appropriately identified and managed.

Critical actions needed to constrain further growth in large estuarine risks are:

- A national partnership, involving federal, state and local governments, to develop shared capacities to manage risks to ‘hotspot’ nationally important estuaries from an overlay of legacy decisions, future urban growth corridors, current and planned critical infrastructure and projected climate change. The partnership would enhance the capacity of planning and risk management across these intersecting domains at local, regional and national scales, and enable tailored guidance for decision-making for development and infrastructure in dynamic waterway contexts
- Targeted research investment to better understand the nature of changing risks to nationally important estuaries; for example, a collaboration between hubs responsible for climate system and ocean research in the third iteration of the National Environmental Science Program. This research must be multi-dimensional embracing physical, social and economic dimensions relevant to particular nationally important estuaries (e.g. Sydney Harbour, Port Philip Bay).
- Development of risk assessment methods suitable for estuaries tailored to significant decisions (e.g. by Infrastructure Australia) and estuary type, and to enable future robust national risk assessment and implementation of a pathways approach to adaptation.

2. Tackling major knowledge gaps for long term coastal adaptation

The Australian Government has an important role in the delivery of science and research that can address matters of national priority. Climate change is likely the most serious and ongoing threat to our coastal regions, with changes already experienced in increasing marine heatwaves. Intense storm events, increasing ocean temperatures, and especially accelerating rates of sea level rise will continue to impact adversely on ecosystems of significance (e.g. Ramsar sites), communities, infrastructure, and shipping and transport.

Key actions to address major knowledge and capacity gaps for coastal adaptation follow.

- There is growing concern now across the research community that higher-impact and lower probability climate and weather events, which could be catastrophic in coastal areas, are not receiving sufficient consideration in risk assessments by either governments or businesses. The current risk assessment approach may lead to an

¹ Scanes, E., Scanes, P.R. & Ross, P.M. Climate change rapidly warms and acidifies Australian estuaries. *Nature Communications* **11**, 1803 (2020). <https://doi.org/10.1038/s41467-020-15550-z>

underestimation of coastal risks and insufficient policy and investment attention in building preparedness for managing future impacts relevant to most Australians.

- The ongoing nature of sea-level rise also needs better recognition in coastal community footprints and the management of long-lived assets. Sea-level rise will not cease when greenhouse gas emissions are stabilised; rather they will continue to rise for many centuries after emissions and temperature stabilisation. A key science study found that emissions since 1750 and pledged to 2030 have already committed a global mean sea level rise of 1 metre (<https://www.pnas.org/doi/10.1073/pnas.1907461116>).
- The horizon of Australia's current climate change projections, however, is relatively short compared to the timeframes of change in the climate system. The UK has developed initial sea-level rise projections beyond 2100 (to 2300); it is time that Australia undertakes similar scenario development, to inform long-term asset resilience (and constrain to some extent the size of the inter-generational adaptation burden).
- Robust datasets and spatial data layers of inundation hazard (reflecting hazard and not jurisdictional footprints) need to be developed and made openly accessible. These datasets need to be recognised as of foundational significance, and the challenges to decision-makers from national agencies de-commissioning relevant data such as in the Australian Exposure Information Platform or OzCoasts, need to be overcome.
- In addition, important lessons from adaptation experience in the last 15 years in Australia include that there are many obstacles to adaptation action, that adaptation pathway planning is complex, and that many current decision-making systems fail to give value to the longer-term future relevant in a changed climate. Further applied research involving coastal decision-makers is needed to help overcome these obstacles.

3. Blue carbon in the coastal zone

There is a well-established correlation between ocean temperature, productivity, and the health and sustainability of blue carbon. Marine heatwaves have already permanently impacted on marine and coastal ecosystems leading to depleted kelp forests and sea grasses in coastal waters, and bleached corals in eastern Australia. Similarly, on the west coast a marine heatwave event in 2011 resulted in mass mortality of biota including 99 percent mortality rate for Roe's Abalone, a species which had yet to recover by 2022. There is a very high level of confidence in the science community that the frequency and intensity of marine heatwaves will increase in the future with climate change. This will impact on carbon storage, climate regulation, and adaptation in coastal ecosystems. There is a need now to more systematically understand how healthy blue carbon supports coastal adaptation, and to link that understanding to coastal adaptation planning and decision-making in all coastal regions.

Maintaining blue carbon stocks in a changing climate will also require substantial restoration, involving a shift in ambition beyond a continuation of current protection efforts. Restoration will require effective bio-regional partnerships, resourcing, and the management of degradation processes.

4. Policy and institutional developments

The magnitude of coastal risks from climate change would benefit from greater national leadership and collaboration. There are lessons that can be learned from previous initiatives led by the Australian Government, from emerging barriers to effective adaptation, including from regulation based on historic and static climate, siloed policy, and from disjuncts between capacity and responsibility for coastal adaptation. A National Coastal Hazard and Adaptation Advisory Committee, with relevant technical support, would be useful.

It is noted that the NAP indicates a commitment to a National Coastal Hazards Management Framework, which is a welcome initiative. Guidance for decision-making under such a framework is needed and must have a tailored technical underpinning to be effective. Multiple design standards for major infrastructure critical for the functioning and productivity of human activities in the coastal zone, and for the nation as a whole, have insufficiently taken climate change and sea-level rise into account. For example:

- Sea-level rise above 0.4 m, which is a matter of ‘when’ not ‘if’, has major implications for critical port infrastructure in, for example, Botany Bay, Port Philip Bay, and Brisbane.
- Sydney airport is also highly exposed to climate change impacts, as documented in the Australian Governments’ 2009 first pass national coastal risk assessment, *Climate Change Risks to Australia’s Coast*, as are other airports with significant implications for productivity through outages or damage.
- Many stormwater systems are still tied in elevation to current low water marks, and their effectiveness and risks concerning stormwater and sewer overflows need greater attention.
- And around Australia’s coastline there are also risks of (potentially many hundreds of) historic landfill sites in the coastal zone that have only been clay-capped and are exposed to greater storm events.

Higher education for practitioner qualifications on climate change is also needed and would benefit from national coordination and facilitation, particularly where the magnitude of climate change suggests reforms may be needed to BAU practice. The UK has some examples of this such as climate change course content for accreditation in some professions in built environment where vulnerability is high (e.g. the UK Construction Industry Council’s toolkit on education and qualification). Incentivising formal vocational training for decision-makers and resource managers in vulnerable regions and managing at-risk assets is also useful.

The magnitude of future risks in a changing climate will need more than collaboration and responsibility sharing – leadership, major knowledge partnerships, overcoming siloes, reform of policies that assume historic climate, and innovation, are now needed to enable implement a NAP involving resource allocations, implementation pathways, timeframes, and evaluation mechanisms. The Australian Government has an important role in national coastal adaptation in knowledge development and in leadership in measures that respond to risks in a manner that aligns with their magnitude and significance. Importantly, many obstacles to coastal adaptation can only be addressed through improved partnership collaboration and coordination of strategic planning and management involving all three levels of government. Good models exist in other federated nations that should be explored as a matter of urgency.

The Australian Coastal Society would be happy to discuss these matters further.

Yours sincerely



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