

Coastal Governance: Embracing Vulnerability and Change

Final project report



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University of the
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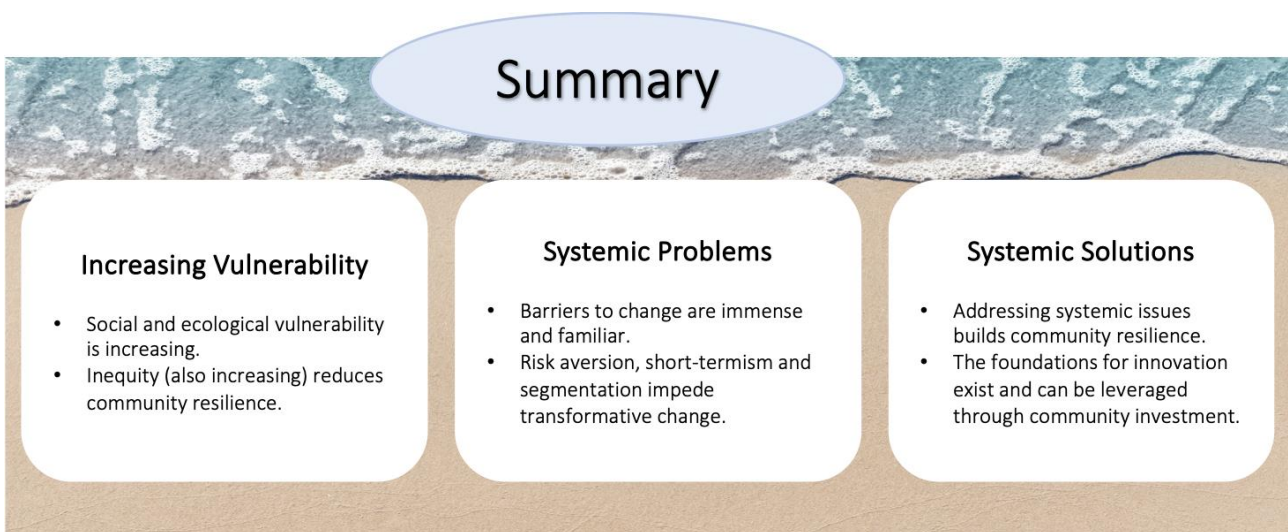
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We also acknowledge the traditional custodians of the lands and waters on which this research was conducted and pay our respects to Elders past, present and emerging.

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Executive Summary

The social-ecological condition of Australian coastal areas continues to decline and is under increasing threat from multiple issues, including the intensification of climate change and urbanisation. Coastal vulnerabilities and governance responses were explored in the fastest growing regions of each Australian State and the Northern Territory. Key findings included: (i) formal instruments are largely not substantive or intentional in relation to addressing coastal issues holistically; (ii) social-ecological vulnerabilities are worsening; (iii) while there have been some improvements in management practice, they are largely incremental rather than transformational, and do not keep pace with the increasing scale of threats; and (iv) systemic responses are needed but hindered by limited resourcing, competitive funding models, mandated approaches that reduce flexibility, legislative inertia, and organisational barriers that discourage experimentation and adaptive learning. Six recommendations are proposed to improve coastal governance in Australia: (i) Widen your circle of friends (ii) Understand your vulnerabilities; (iii) Ensure laws and policies are substantive and intentional; (iv) Invest in action not paper; (v) Embrace experimentation; and (vi) Stick to your preferred future.



Introduction

This report summarises the outcomes of a 4-year Australian Research Council (ARC) funded project: *Coastal Governance: Embracing Vulnerability and Change*. The project sought novel ways to manage the Australian coast acknowledging that despite over 50 years of integrated coastal management, the condition of the coast has continued to decline and is increasingly threatened by the cumulative impacts of climate change and urbanisation.

In-depth discussions with coastal managers and community service providers that respond to vulnerability in Australia's most rapidly growing coastal communities identified: (i) the types of vulnerabilities experienced (ecological and social); (ii) the range of responses; and (iii) barriers, enablers, and innovations in coastal governance.

The project was the first national, cross-sector examination of coastal governance in Australia. It represents a collaboration between the University of the Sunshine Coast (Australia), Brock University and Waterloo University (Canada), and Waikato University (New Zealand), and included four PhD students.

The results of the project have been published in peer-reviewed journals, each with a publicly accessible 'Research Insights' summary. This report summarises key findings and provides links to further information via the project website (www.usc.edu.au/coastalgovernance). Based on these findings, recommendations to support Australian coastal communities are proposed.

How to use this report

Throughout the report, you will find hyperlinks to 'Research Insights'—1-page summaries of project outputs (e.g., peer-reviewed journal publications). These provide a succinct overview of the aims, approach, outcomes, and implications of the related research findings and are numbered accordingly. For example, the link to Research Insight #1 is identified as: [RI#01](#).

Context

The Australian coast is under threat (RI#02). Steps have been taken to respond (e.g., coastal adaptation planning) yet social-ecological vulnerability is increasing. This has led to calls for more inclusive decision-making, adaptive approaches, and greater national leadership. Progress has been made, yet there remain barriers to implementing the scale of reforms required to address the scale of the challenges faced.

This project sought to deepen understanding of the barriers and enablers to achieving significant change in the governance of coastal areas through in-depth case study research in rapidly growing Australian coastal communities (Figure 1). These communities experienced the most rapid rate of population growth in the five years prior to project commencement. They mostly lie on the outer margins of major urban centres, and contain diverse populations (e.g., age and income profiles) and exposure to climate hazards.

Further information

- For more information on the aims of the project, see: www.usc.edu.au/coastalgovernance/about
- For more information on the case-study sites, including socio-demographic profiles and vulnerability to natural hazards, see: www.usc.edu.au/coastalgovernance/case_study_areas

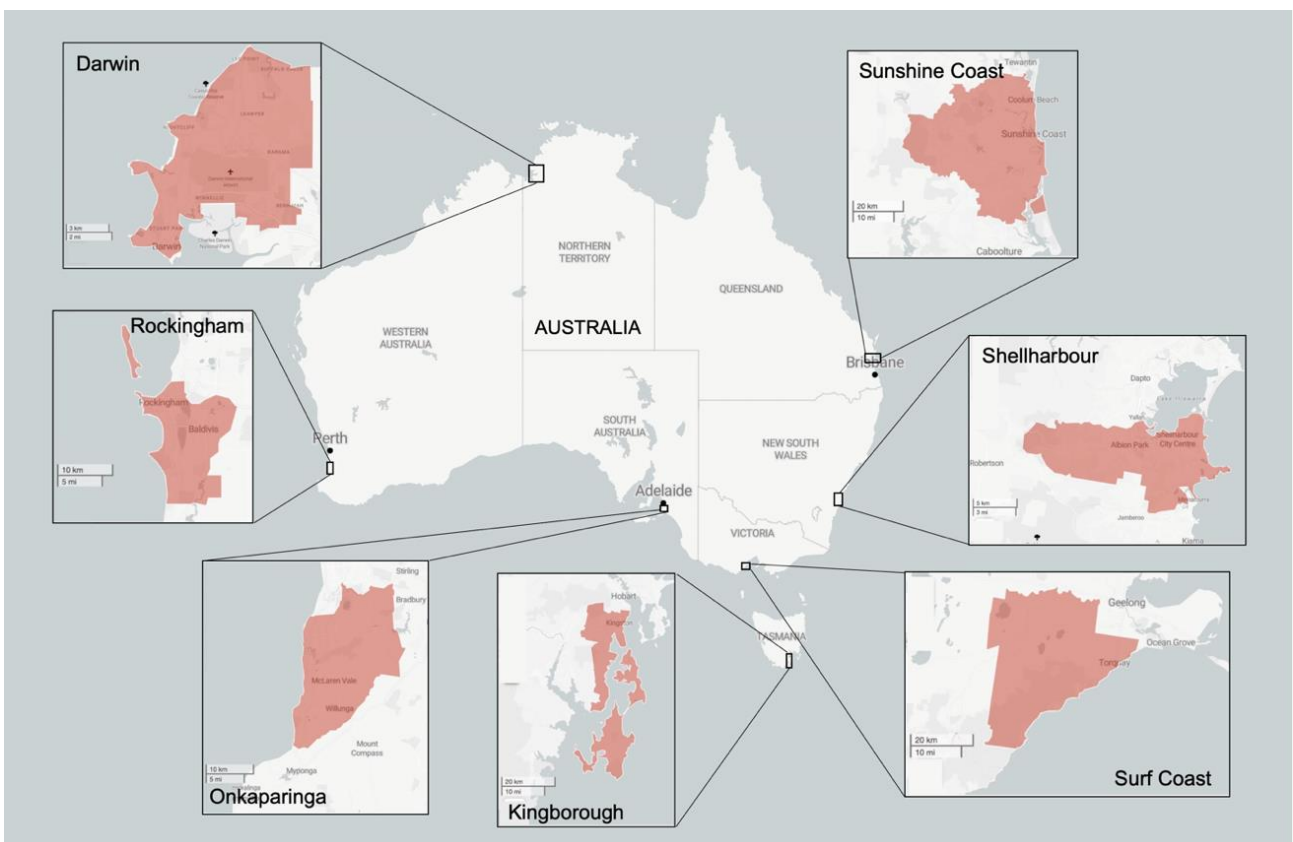


Figure 1 Case study areas

What did we do?

A [team of researchers](#) worked with Australian coastal vulnerability practitioners (i.e., coastal managers and community service providers) to answer the following questions:

- What is the nature of vulnerability in the Australian coastal zone?
- What governance mechanisms are in place to address vulnerability?
- How effective are existing governance approaches?
- What changes are required to respond to vulnerability more effectively?
- What are the barriers and enablers to change, particularly transformational change?

We discuss key findings in relation to each of these questions and provide recommendations to achieve innovation in coastal governance.

Further information

- For more information on the project team, see: www.usc.edu.au/coastalgovernance/project_team

What did we find?

What is the nature of vulnerability in the Australian coastal zone?

It is widely accepted that the Australian coast is vulnerable to the impacts of climate change and urbanisation, due to population growth and a society that values being 'by the sea'. Less understood is the social vulnerability of Australian coastal communities, which are commonly considered affluent, lifestyle locations. While coastal management practices have evolved to better incorporate community values, the focus on physical environmental change and the social values potentially at risk from that change, neglects issues of social wellbeing and equity that can impact public engagement and participation in coastal management, and the inclusiveness and effectiveness of responses. In the case study communities, we found social vulnerabilities not commonly associated with coastal areas, including mental ill health, mortgage stress, low levels of literacy, homelessness, social isolation, and youth crime. We also identified the intensification of more established vulnerabilities, such as unemployment and limited educational opportunities and health care services (see [RI#05](#) and [RI#06](#)).

What governance mechanisms are in place to address vulnerability?

Coastal vulnerability in Australia is primarily managed by: (i) coastal managers that plan and manage the coastal zone; and (ii) community social service providers that deliver financial and social support to vulnerable community members. Together, their ability to proactively (and collaboratively) respond to vulnerability has significant impacts on the resilience of Australian coastal communities.

Activities undertaken on the coast are guided by Acts, policies, and plans (collectively referred to as institutional instruments) that set the goals and objectives of management. Despite the broad range of sectors operating on the coast, the findings indicate that institutional instruments only contribute to coastal management if intentionally designed to do so, and rarely meet all the principles of best-practice coastal management (see [RI#09](#)). A focus on people over environment dominates, particularly in local scale plans, strategies, and policies, with negative implications for environmental sustainability (see [RI#01](#)).

Despite the flaws in institutional arrangements, coastal managers adopt several 'best practice' approaches to respond to coastal vulnerability ([RI#28](#)). These include inter-agency and cross-scale collaboration (e.g., across State government departments, and across communities, Local and State governments) to provide knowledge and capacity to respond to vulnerability. Collectively these responses represent a planned approach to addressing some coastal vulnerabilities through a risk-based lens focused primarily on protection of property and infrastructure.

"We've always done community engagement. We've always done options assessments, but now through the [coastal program] and its associated guidelines, [we are] applying [these approaches] more consistently, in more-depth ..." (Victoria, Coastal Sector 06).

A range of drivers are responsible for the evolution in current approaches. For coastal managers (Figure 2), change has been driven by hazard events, lobbying (e.g., the formation of local government coalitions), policy change, growing community awareness of risk, population/economic growth imperatives, a step-change in best-practice management of climate risks, and/or the failure of existing policies, plans or approaches.

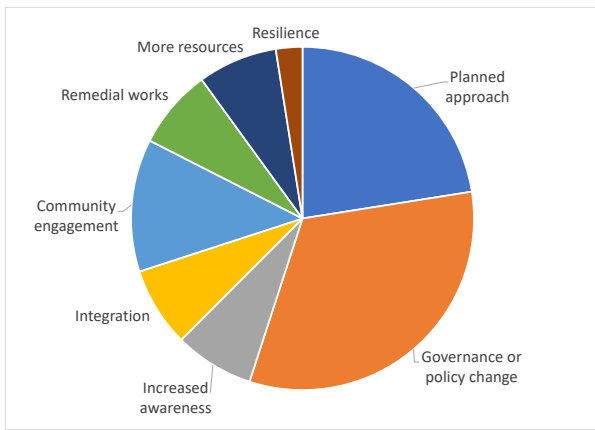


Figure 2 Coastal management changes that have been made to respond to vulnerability

“I think that there's a growing awareness that we need a planned response to climate change impacts. Over the last three years, more and more councils are embarking on coastal adaptation planning” (South Australia, Coastal Sector 03).

“There wasn't a systematic process to identify environmental risks, or any process to really embed climate change decision making throughout the organization. So that would be the biggest change that we're still currently undergoing” (Northern Territory, Coastal Sector 01).

Community service providers (CSPs) address vulnerability by providing financial and material assistance or services to those in need. CSPs have made changes to respond to increasing vulnerability, including providing more financial support and moving into new areas of service delivery – all to better meet growing community needs. However, some organisations rely on government funding and are forced to modify their services to meet ever-changing government priorities.

“I think in the past there were many things that we wouldn't do, the blocks that used to [stop us from] giving help in certain areas are not there anymore. For instance, we didn't pay rego ... we didn't give out petrol vouchers unless it was an emergency That's all gone now” (Queensland, Community Sector 03).

“We didn't do much in the emergency response space five years ago. We're probably now the go to organization for government and local government when it comes to dealing with a crisis” (New South Wales, Community Sector 04).

“It depends on what government wants. ... outside of the NDIS there is no funding, no programs, no service” (South Australia, Community Sector 02).

How effective are existing governance approaches?

The goals of coastal governance were defined as being sustainable, collaborative, coordinated, transparent, cross-scale and planned (RI#28) (Figure 3). Whilst most coastal managers are optimistic that existing approaches will achieve these goals, challenges to effective coastal governance remain, including politics, resourcing, and community buy-in (RI#28 and RI#29).

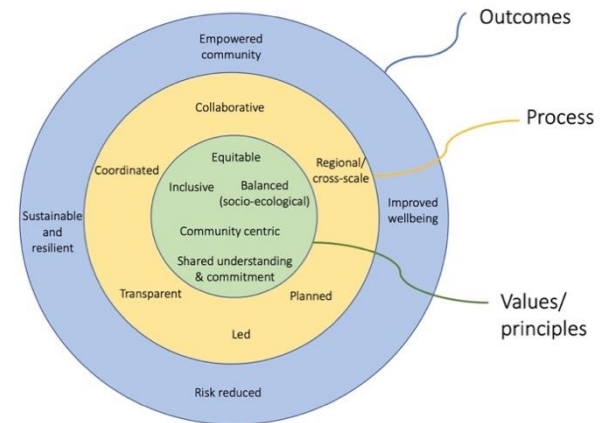


Figure 3 Goals of coastal governance, as defined by vulnerability practitioners (see RI#28).

However, changes in coastal governance have been mostly incremental rather than transformational (coastal sector) and more reactive rather than proactive (community sector) (RI#29), casting doubt over whether the goals will be realised within the necessary timeframes.

“[There have been] changes, maybe not huge changes, but growth certainly” (New South Wales, Coastal Sector 03).

“[It has been] a bit of an evolution. The planning revision came in 2016 but we were leading up to that thinking from about 2007/08. So the Planning Act and its various iterations over the years has been gradually getting us to the position we are now” (Queensland, Coastal Sector 01).

“I guess you could describe it as strategic incrementalism, where we have a master plan about gradually reducing our risk over the long term, but we recognize it's quite incremental” (Tasmania, Coastal Sector 01).

What changes are required to respond to vulnerability more effectively?

The scale of the challenge facing coastal communities demands innovations in coastal governance. Many of the actions taken to respond to vulnerability by coastal managers and community service providers are considered innovative but deliver incremental rather

than transformational change (RI#29). Innovation is hindered by significant barriers faced when implementing large-scale change (see next section) and sectoral division of roles and responsibilities. Coastal managers respond to the physical vulnerabilities on the coast, while community service providers respond to social vulnerabilities. Limited cross-sector collaboration makes integrated management challenging and results in prioritisation of effort towards maintenance of the coastal margin, to conserve public (e.g., foreshore reserve) and private values (e.g., protection of property), rather than addressing systemic issues driving increasing levels of inequality in Australian coastal communities and declining ecological integrity (RI#26).

We did however find isolated examples of innovation that involved collaboration across sectors, which was mutually beneficial to all groups involved and reflected a commitment to sustainability. For example, a community service organisation in Victoria contributed to the social wellbeing of their community whilst also supporting ecological wellbeing. This exemplar drew on individual and community capacity to respond to food insecurity in a way that built and invested back in the community through, for example, school-based volunteer programs. Benefits to the community also occurred in areas beyond the organisation’s mandate, for example, the organisation returned waste to hobby farmers to feed livestock and for biofuel, while used

packaging was given to art local groups for use as canvases.

“We were just responding to need in our community and beyond ... but the by-product has been a sustainable hub where people come to offer their support ... skillset or knowledge or come to us for something” (Community Sector, Victoria 02)

The capacity that supported these innovations is already available in many coastal communities and established prior to crisis events. In this example, the mobilisation of existing community capacity enabled a highly effective response to Covid-19 demonstrating the importance of investing in communities prior to hazards (RI#17; RI#29).

What are the barriers and enablers to change, particularly transformational change?

Barriers to institutional change, particularly transformational, are immense and familiar (Figure 4), including limited resourcing, competitive funding models, mandated approaches that reduce flexibility, legislative inertia, and cultural barriers (especially institutional disallowance of failure) (see RI#29). Responding to barriers requires a systemic (universal) approach. Recommendations to achieve such an approach are outlined in the following section.

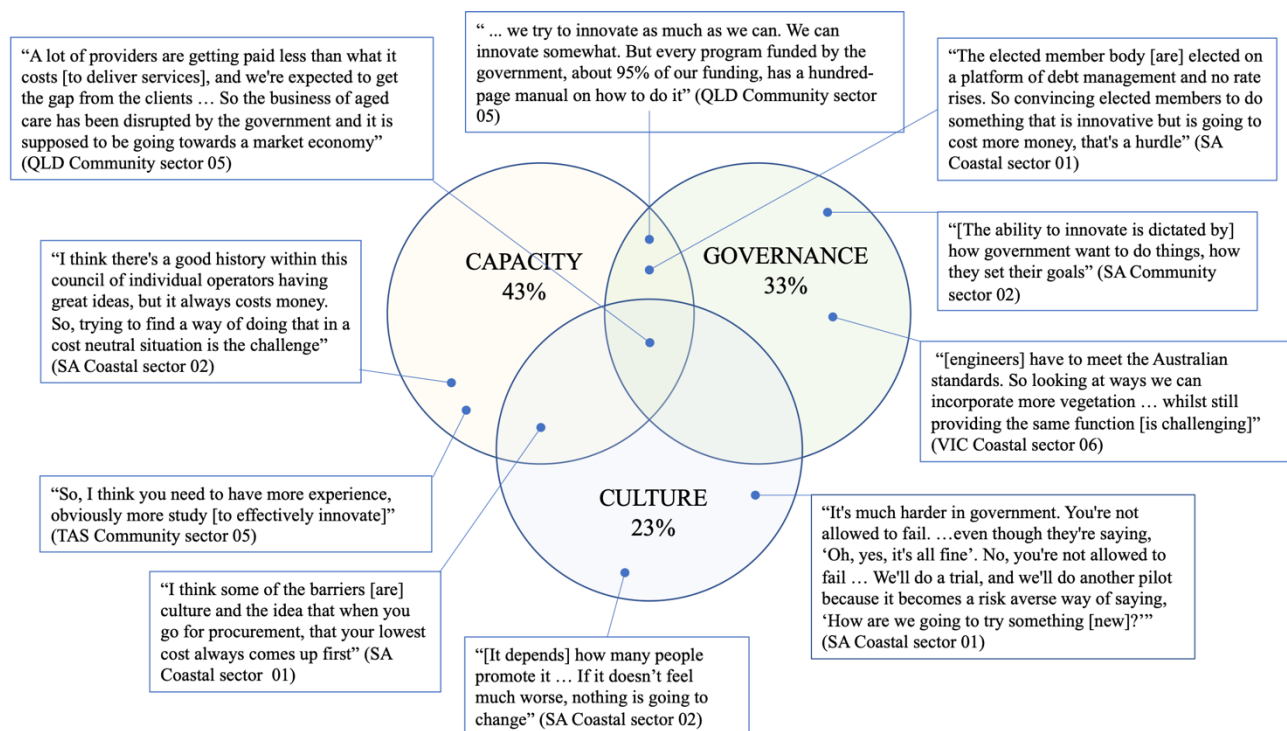


Figure 4 Barriers to change in coastal governance.

Moving forward: Delivering innovations in coastal governance

Through this research several recommendations to provide the enabling conditions for transformational change in coastal governance were identified.

Widen your circle of friends

Collaboration is key to achieving a more integrated and systemic approach to coastal governance.

Significant benefits for supporting vulnerable social-ecological vulnerabilities are achieved through cross-scale and cross-sector collaboration ([RI#29](#)). Rather than looking at one issue in isolation, with one service provision response, deeper impact is made possible through a systemic approach that achieves multiple objectives – one that addresses the issue itself and the underpinning drivers of vulnerability.

Understand your vulnerabilities

Understanding the increasingly diverse, dynamic contexts and lived experiences of coastal communities.

The information on which understandings of vulnerability tend to be based is limited, particularly social vulnerability, which often relies on census data collected at five-year intervals and cannot keep pace with rapid changes experienced in many coastal communities (see [RI#06](#)). There is a need to extend the focus of vulnerability assessments beyond the physical impacts of hazards (e.g., erosion, inundation) to understand coastal areas as complex social and ecological systems facing cumulative risks (see [RI#01](#); [RI#02](#); [RI#06](#); [RI#29](#)). This involves expanding discussions on coastal vulnerability and management from coastal managers and stakeholders directly impacted, to additional sectors responding to vulnerability in coastal communities. Better understanding the links between social and ecological processes and outcomes is imperative to more informed coastal governance.

Ensure laws and policies are substantive and intentional

Holistic laws, policies, and actions that support social-ecological systems.

Revise Acts, policies and plans away from a human-risk centred approach to one that intentionally and substantially addresses all values of the coast (social and ecological) ([RI#09](#); [RI#01](#)). These formal instruments should also address systemic issues impacting vulnerability, such as housing affordability, access to education and health services, and provide the foundation for more collaborative partnerships between organisations and groups. Such changes would

expand the scope of activities for vulnerability managers, including coastal managers and community service providers (among others) and requires increased investment to ensure adequate resources (human, financial, material) for planning and delivery.

Invest in action not paper

Prioritise investment towards interventions and action beyond the development of policy and plans.

Significant investment has been made in developing policies and plans to support effective responses to coastal vulnerability but there remain barriers to implementation. Investing directly in communities and organisations to build capacity and connection is important for transformation and the translation of plans to action (see [RI#29](#)), especially as innovations occur in organisations and communities with high individual and community capacity (e.g., social networks, skilled volunteers, a commitment to sustainability).

Embrace experimentation

Provide the permission to have a go.

Innovation occurs through trial and error. A culture of risk aversion impedes innovation, which is compounded by a narrow view of success through an emphasis on economic measures of value to the exclusion of social measures. Broadening partnerships to work with sectors that have greater flexibility to experiment (research, private, NGO), and challenging dominant paradigms regarding what success looks like, will facilitate innovation ([RI#29](#)).

Stick to your preferred future

Establish a shared vision for coastal communities that reflect social and ecological needs.

In the absence of a defined sought-after future, transformational change will be limited. Establishing a shared vision requires extensive community engagement grounded in social and ecological respect. Yet engagement is challenged by competing (self) interests, miscommunication ([RI#18](#)), lack of public support ([RI#19](#)), exclusion of voices ([RI#06](#)), and short decision timeframes. Advances in public engagement have been made through coastal adaptation planning activities. Taking these lessons and expanding community engagement through a procedural justice lens ([RI#06](#)) will provide an improved foundation for developing shared visions for coastal communities.

The recommendations represent significant changes that will take time and effort. The time to start is now. Even with significant reductions in greenhouse gas emissions the effects of climate change will continue to impact coastal communities for centuries. Difficult decisions regarding how to respond to these impacts will need to be made, and by advancing these discussions and implementing the measures needed to support this process, Australian coastal communities will be in a stronger position to respond to the challenge.

Further information

- For more information on the results of the research, see: www.usc.edu.au/coastalgovernance/publications and www.usc.edu.au/coastalgovernance/research_insights

Coastal Governance: Embracing Vulnerability and Change

Research Insights

| Title | RI # |
|--|--------------------|
| What is the problem with the coast? | 01 |
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Why did we undertake this study?

How we define our problems determines the solutions; yet problem framing within coastal management is rarely critiqued. Consequently, opportunities are missed for comprehensive policy response, which is vital in addressing the complex challenges impacting the coast. We addressed this gap, by exploring how Australian coastal problems and solutions are framed.

How was it done?

We assessed the problem framings within 48 institutional instruments (legislation, policies and plans) that contribute to coastal management in Australia. We then explored trends in problem framing across scales, sectors and jurisdictions.

What did we find?

An anthropocentric view of the coast dominates, but is not consistent across scales, jurisdictions or sectors.

- An anthropocentric (human-centred) framing dominates the outcomes sought via management actions across all scales. However, this is especially evident at the local scale.
- Hazard management plans are promoted under the anthropocentric framing, which directs attention to erosion and inundation, and neglects other coastal issues such as pollution and biodiversity loss.
- While prioritising one frame can enable consistency and coordination of some management actions, it also neglects alternate views, confining management response to an individual problem-solution framing.

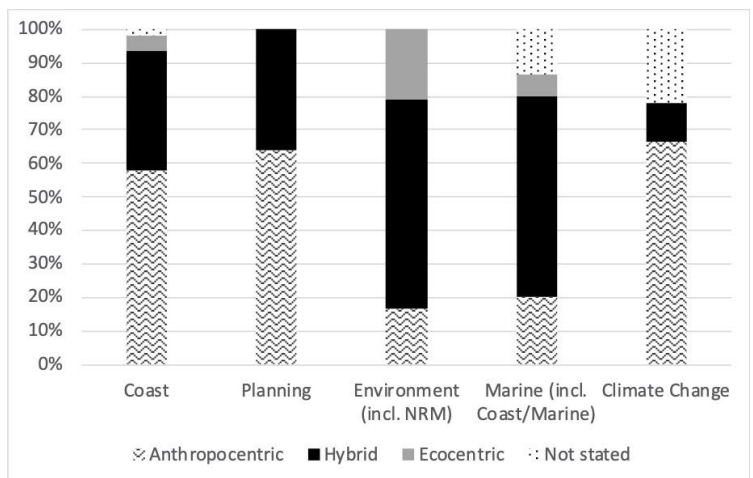


Figure 1: Coastal sustainability framings by instrument theme/sector.

What are the implications?

The findings allow coastal managers to consider the implications of different problem framings. Action can then be taken to modify problem frames, where required, to facilitate integrated coastal management. The methodological approach developed also holds value for use in other complex governance contexts.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.envsci.2021.10.031>

Citation: Elrick-Barr CE & Smith TF, 2022, 'Problem framing for Australian coastal management', *Environmental Science & Policy*, Vol 217: 218-227

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Oceans and coasts provide important ecosystem, livelihood, and cultural values but they are under threat. To respond to these threats (e.g., through policies and management actions), there is a need to first systematically understand and categorise them.

How was it done?

We undertook a systematic literature review of papers addressing threats to Australia’s marine and coastal environments published between 2010-2020. The term “threat” was broadly interpreted to consider all actions that cause harm to the ocean or coasts, from climate change to governance and other socio-political factors. Scopus and Web of Science databases were searched using terms: Australia, threat*, coast*, ocean* and marine*; and inclusion and exclusion criteria applied. 226 papers were included in the final review. In each paper, threats were identified and categorized, first into 19 threat categories, and then into three macro categories: (i) threat from use and extraction; (ii) environmental and human induced threats; and (iii) policy and socio-political threats.

What did we find?

- A total of 307 threats to Australian oceans and coasts were described, with many threats interlinked and overlapping, yet only 45 of the 226 papers (20%) discussed multiple threats.
- Threats across all categories increased over time, with threats associated with use and extraction increasing more rapidly during 2017–2020.
- Threats were most often described for their impacts on environmental values (68%), followed by economic (14%), socio-cultural (12%), and Indigenous (6%) values.

Silos between sectors, case-by-case approvals processes, and logistical challenges of creating and maintaining cumulative impact assessments, may all serve to reduce understanding of cumulative threats.

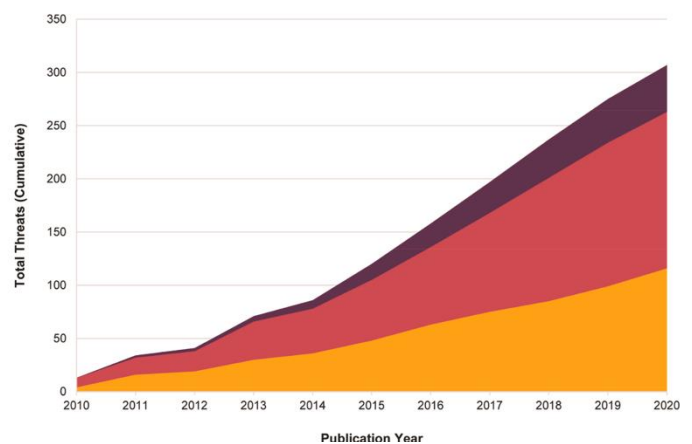


Figure 1: The cumulative number of threats identified per macro category over time (Laubenstein et al 2022)

What are the implications?

Ocean and coastal management could be improved through greater consideration of cumulative threats. In its absence there is an underestimation of the severity and extent of current and future threats to Australia’s ocean and coasts. More resources should also be devoted to investigating impacts on Indigenous values, which is comparatively under researched.

Want more information?

The full paper is available from: <https://www.sciencedirect.com/science/article/pii/S0964569122003076>

Citation: Laubenstein T, Smith TF, Hobday AJ, Pecl GT, Evans K, Fulton EA, O'Donnell T (2023) Threats to Australia's oceans and coasts: A systematic review. *Ocean & Coastal Management*, 231: 106331

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Science has demonstrated the climate is changing, governments agree that the science is settled, yet concerted action to mitigate and adapt to climate change is lacking. As a result, adverse global climate changes increase each year in the form of floods, heatwaves and sea-level rise. This study brought a spotlight to this conundrum, arguing for a change in scientific practice that might lead to concerted climate action.

How was it done?

We explored three options for the climate change science community: (i) deliver more science, collect more evidence of deleterious impacts and hope for policy change; (ii) more social science research and advocacy on climate change to better understand why action has not occurred, and how to enable the changes required; or (iii) stop research that simply documents global warming and maladaptation, and focus instead on exposing and renegotiating the broken science-society contract.

What did we find?

In considering the three options, we found:

- The first two are not tenable.
- Given that climate change science is ‘settled’, and has been for decades, the evidence suggests climate research does not lead to government action.
- Increases in social science research, scientific advocacy and support from civil society, have also not led to systemic change in government action. There is no evidence that more social science research and traditional forms of advocacy will lead to transformative action.
- The last option, a moratorium on science, is least palatable, but most likely to deliver sought after change.

What are the implications?

A critical juncture has now been reached for human and planetary well-being. Given the tragedy of climate change science, a moratorium offers the only real prospect for restoring the science-society contract. Other options are seductive but offer false hope.

Want more information?

The full paper is available from:

<https://www.tandfonline.com/doi/full/10.1080/17565529.2021.2008855>

Citation: Bruce C. Glavovic, Timothy F. Smith & Iain White (2021) The tragedy of climate change science, *Climate and Development*, DOI: 10.1080/17565529.2021.2008855

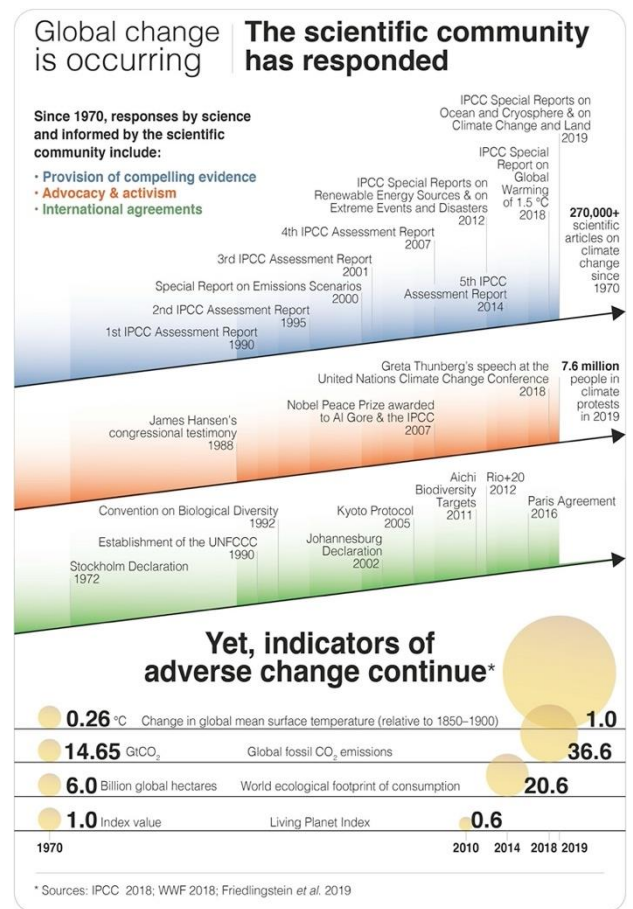


Figure 1: The tragedy of climate change science

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Coastal Governance: Embracing Vulnerability and Change



Path dependency and future adaptation of coastal cities: examples from the Asia-Pacific

Why did we undertake this study?

The need for Asia-Pacific coastal cities to adapt effectively and sustainably to sea-level rise is growing. If such adaptation does not occur in a timely manner, then it could result in socio-economic problems that will reverberate throughout the region.

How was it done?

Drawing on examples of coastal Asia-Pacific cities characterised by differing geographical settings and cultural contexts, we explored coastal hazards, adaptation drivers, past and planned approaches to adaptation, capacity (constraints and resources) and path dependencies.

What did we find?

Path dependency has a powerful influence on recent and planned (future) adaptation to climate change in coastal cities across the Asia-Pacific region. Further:

- Despite advocacy for transformation, the futures for all five cities favour protection, which is also the most common recent (past) approach.
- There is a lack of sufficient funds to enable transformational rather than incremental adaptation, particularly in poorer contexts like Nadi and Manila.
- The dominance of 'protect' approaches is an expression of inhabitants' desire to maintain city's original purpose: growing prosperity.

While adaptation planning in the region is hampered by the historical favouring of 'protect' responses, it is those cities where decision-makers are regularly elected (rather than appointed) that may be slowest to embrace more transformative responses because of popular resistance to their disruptive effects.



Figure 1: The Asia-Pacific region showing the five case study sites

What are the implications?

For the future, it must be hoped that a growing awareness of the severity and immediacy of climate change, as well as the likelihood of irreversible multi-century future sea-level rise, will inform not simply the agendas of key government decision-makers but also the minds of all urban dwellers so that transformative adaptation will become more widely adopted.

Want more information?

The full paper is available from: <https://doi.org/10.3389/fenvs.2021.642385>

Citation: Nunn, P.D., Smith, T.F., Elrick-Barr, C. (2021) Path Dependency and Future Adaptation of Coastal Cities: Examples from the Asia-Pacific. *Frontiers in Environmental Science* 9, 359.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Coastal communities are undergoing unprecedented social and ecological change. While quantitative measures provide evidence of the rate and magnitude of these changes, fewer studies offer qualitative accounts from the perspective of those tasked with responding to impacts. This study sought to offer authentic, affective representations of rapidly changing and diverging coastal regions through the voices of those on the frontlines of socio-ecological change.

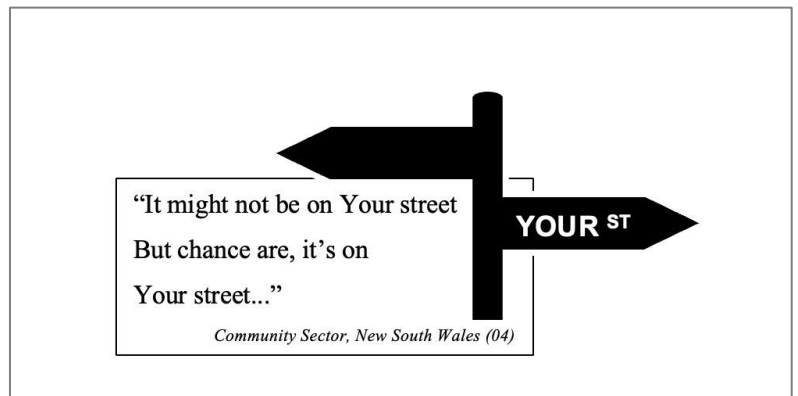
How was it done?

Participant-voiced poems were generated through over 65 semi-structured interviews with coastal decision-makers (e.g., local and state government employees) and community representatives (e.g., government and non-government service providers) in Australia's fastest growing coastal regions. The poems were used to convey the uncertainties and devastation arising across increasingly unequal coastal communities. The nationwide study included cases from each coastal Australian State and Territory.

What did we find?

In this study, we engaged poetic devices (e.g., rhythm, repetition) and used participant's own words to develop collective narratives across the case sites. As a novel technique, 'reflexive prompts' that direct questions from participants to potential audiences (not least, the research team) were included to enhance the affective and political efficacy of the poems. In combination, 'Roughened Terrain', 'Erosion' and 'Unconsolidated' evocatively portray:

- Stark contrasts between the lived experiences of 'neighbours'.
- Intensifying inequalities often 'hidden' behind mown lawns and front doors.
- The significant role of societal structures in creating and sustaining inequalities through complicated, non-adaptive and hierarchical social systems.



What are the implications?

Qualitative studies that share the impacts of socio-ecological change through the direct voices of those on the front lines of response provide a powerful and necessary contribution to a field dominated by quantitative and summary accounts. Poetic inquiry is one method, among many, that can viscerally represent the lived experiences of increasingly vulnerable contexts. In so doing, this study reveals that life in the Anthropocene is distinguished by intensifying inequalities and is more accurately termed the Obscene. This demands a renewed focus on the perpetrators of such issues towards structural changes that comprehensively support equity across all dimensions of socio-ecological systems.

Want more information?

The full paper is available from: <https://rgs-ibg.onlinelibrary.wiley.com/doi/full/10.1111/geoj.12559>

Citation: Thomsen D, Smith T, Elrick-Barr C (2023). The Anthropocene Obscene: Poetic inquiry and evocative evidence of inequality, *The Geographical Journal*.

Acknowledgements

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Social and ecological wellbeing is difficult to attain. Understanding community needs is a first step in implementing policies and programs to improve wellbeing. Australian coastal communities are experiencing rapid change affecting wellbeing. Yet community needs are rarely the focus of policy or management addressing coastal vulnerability. This study sought to better understand community needs in rapidly growing Australian coastal communities and implications for sustainable and just coastal communities.

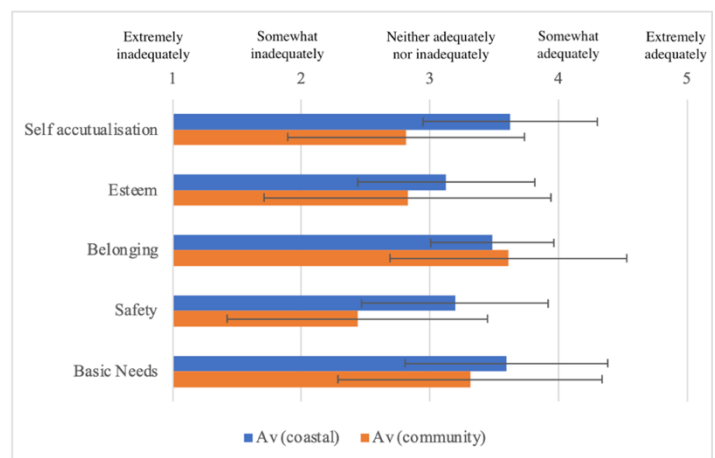
How was it done?

We interviewed 68 coastal and community sector representatives in Australia’s most rapidly growing coastal communities. Interviews discussed themes of vulnerability, coastal governance, innovation, and community need. When discussing community need, respondents rated how well their community can meet its needs (physiologic, safety, love and belonging, esteem, self-actualisation). Significant differences in the assigned rankings were explored in Qualtrics Stats iQ by sector, scale and jurisdiction. Themes in verbal responses were identified via thematic analysis.

What did we find?

Despite measureable differences in the socio-economic status of the case study communities, inequity (the presence of those that have and those that have not) was universal. Furthermore:

- On average, community needs are rarely adequately met. Even in communities considered affluent, conditions of vulnerability belie the image of prosperity.
- Social vulnerabilities not often associated with coastal communities, (e.g., mental ill health, mortgage stress, homelessness, social isolation, and youth crime) were uncovered, alongside intensifying and more established vulnerabilities such as unemployment, limited educational opportunities, and limited health care.
- *Within* and *across* sectors, respondents’ perspectives on community needs varied. Cross-sector differences were particularly apparent regarding the impact coastal hazards can have on the ability of the community to meet its needs.



What are the implications?

Different perspectives can ensure a holistic approach to addressing community needs. Yet divergence can be a problem when issues are addressed in isolation, or when no action is taken. Systemic problems unaddressed increase inequity with negative impacts on community resilience. To take advantage of the opportunities that a broader perspective of vulnerability brings requires greater coordination across sectors, to ensure needs are not only identified, but receive the resources/attention to address them.

Want more information?

The full paper is not currently available online. Keep an eye on the project website for updates.

Citation: Elrick-Barr C ,Thomsen D, Smith T (forthcoming), The wellbeing of rapidly growing Australian coastal communities: rising inequity and vulnerability, *further details forthcoming*.

Acknowledgements

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Coastal regions are exposed to multiple pressures including climate change hazards, resource degradation, urban development, and inequality. Tourism is often raised as either a solution to, or exacerbator of, such threats to ecosystems and sustainable livelihoods. This study sought to better understand the role of tourism in achieving sustainable development and resilience in coastal areas.

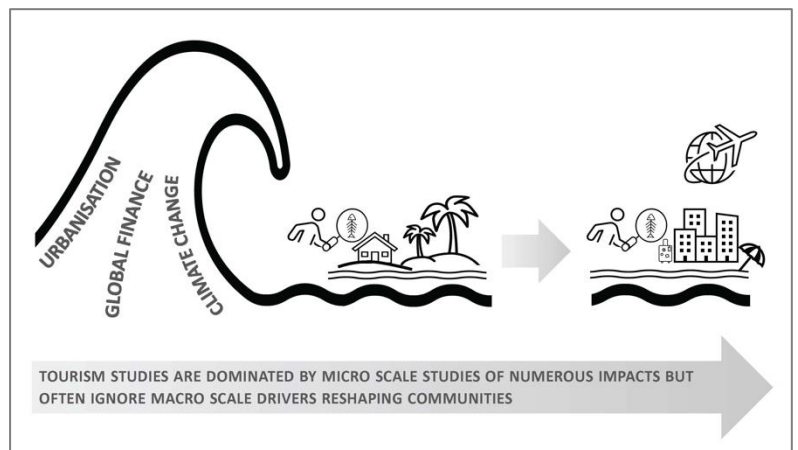
How was it done?

The impacts of tourism on society, economy and environment were explored through an analysis of highly-cited literature. Sentiment analysis was performed on 44 highly-cited papers addressing impacts of tourism on coastal regions and references to the impacts of tourism on: (i) society; (ii) economy; and (iii) environment, were recorded as either positive, negative, neutral or mixed. The analysis was compared with the findings of whole-of-sector reviews and reports, including grey literature, on the tourism sector to situate the findings within macro trends.

What did we find?

There is a divide within the tourism discipline, where highly-cited papers focused on environment and society generally show negative sentiment towards the impacts of tourism, while those that focus on the economy generally show positive sentiment.

- Negative sentiment was present in 84% of papers, compared to 52% identifying a positive impact of tourism.
- None of the 35 papers discussing environmental conditions expressed positive sentiment.
- While positive sentiment was evident in 76% of papers that discussed economic contributions, they largely failed to acknowledge broader adverse economic impacts.



The highest cited papers on the impacts of tourism on coastal areas represent a disparate set of micro impacts, which cumulatively represent significant social-ecological challenges, but with limited interrogation of underpinning macro drivers.

What are the implications?

There is a need for studies that focus on coastal tourism as a complex globalised system. Few highly-cited studies focus on the underlying business model of the tourism sector, which some sector reports suggest can be defined as property development. When viewed through this lens, the tourism sector may be seen as a far-reaching global business that exploits peoples and places for the benefit of wealthy elites. The findings have implications for both the scale at which tourism research occurs, and for considering tourism within the context of Integrated Coastal Zone Management and sustainable development.

Want more information?

The full paper is available [here](#)

Citation: Smith T, Elrick-Barr C, Thomsen D, Celliers L & Le Tissier M (2022). Impacts of Tourism on Coastal Areas. *Cambridge Prisms: Coastal Futures*, 1-17. doi:10.1017/cft.2022.5

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

The concept of ‘adaptation’ has become mainstreamed, especially when discussing responses to climate change. However, there has been little critique of whether adaptation is consistent with its original intent, and what the long-term implications are for the resilience of communities.

How was it done?

We examined historical notions of adaptation from pre-Darwin through to the present to assess changes in conceptualisation, purpose, and intent. We coupled this with an example of coastal adaptation in practice to show the changes and implications.

What did we find?

Historical notions of adaptation (self-modification) are not reflected in contemporary notions of adaptation (modification of external environments), specifically:

- Contemporary adaptation is better defined as manipulation;
- Manipulation can stress social-ecological processes and decrease the opportunity for authentic learning experiences; and
- Manipulation can eventually lead to path dependencies and system collapse.

The way adaptation is conceived is essentially related to the intention of who and what should adapt.

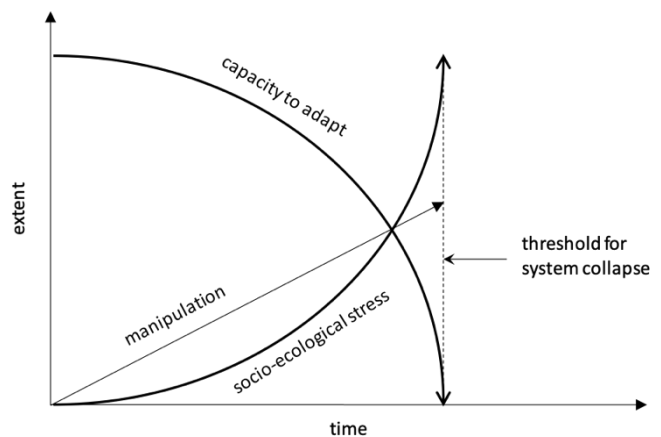


Figure 1: Relationship among manipulation, adaptive capacity, and social-ecological stress

What are the implications?

Different types of adaptation responses can have dramatic implications for coastal communities. Adaptive behaviours represent long-term strategies for building resilience, whereas manipulative behaviours represent short-term strategies with uncertain consequences for coastal vulnerability and resilience. This is because manipulative strategies can obscure valuable learning opportunities, create adverse path dependencies, and lessen the likelihood of effective adaptation in future contexts. This research forms the theoretical framework for better understanding coastal governance to support resilient communities.

Want more information?

The full paper is available from: <http://dx.doi.org/10.5751/ES-04953-170320>

Citation: Thomsen DC, Smith TF & Keys N, 2012, Adaptation or manipulation? Unpacking climate change response strategies, *Ecology and Society*, 17(3): 20.

Acknowledgements

This research was supported by the CSIRO Flagship Collaboration Fund through the Coastal Collaboration Cluster and the South East Queensland Climate Adaptation Research Initiative. The continuing research is supported by the Australian Government through the Australian Research Council Discovery Projects Funding Scheme (Project FT180100652). This work contributes to Future Earth Coasts, a Global Research Project of Future Earth. The views expressed herein are those of the authors and are not necessarily those of the CSIRO, Australian Government, the Australian Research Council or Future Earth Coasts.



Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Coastal management is guided by laws, policies and plans; yet there has been no assessment of the intent or substantiveness of those instruments to further coastal management goals. The absence of such information limits opportunities for improvements in coastal management.

How was it done?

We analysed 92 institutional instruments with a potential role in coastal management in Australia. Each instrument was reviewed against criteria that explored the extent to which the instrument purposefully targeted coastal issues (intentionality), and whether they addressed elements of good practice coastal management (substantiality).

What did we find?

The social, economic and environmental values that the Australian coast provides are recognised within instruments that contribute to coastal management in Australia. However:

- threats to Australia’s coast are not adequately identified or managed in line with good practice coastal management;
- institutional instruments do not contribute to coastal management unless intentionally designed to do so; and
- even in the presence of intention, comprehensive mechanisms for action are limited.

The lack of comprehensive action is particularly evident in instruments operating at the local scale.

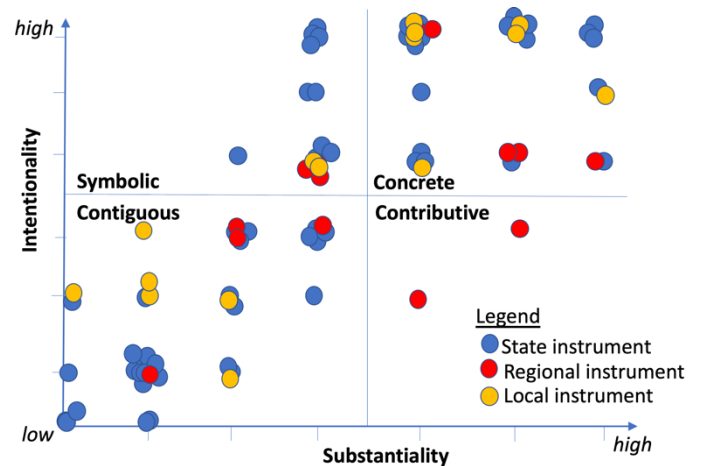


Figure 1: Intentionality and substantiality matrix, Australian institutional instruments

What are the implications?

If the Australian coast is to be effectively managed, there is an urgent need to move beyond recognising the values the coast provides, to comprehensively addressing the multiple and cumulative threats to coastal areas (e.g. climate change, urban development, resource extraction, and pollution). Furthermore, a reliance on local scale action to meet coastal sustainability objectives, through for example allocation of responsibility for coastal management to local governments, is misplaced in the absence of greater national and State level support.

Want more information?

The full paper is available from: <https://www.sciencedirect.com/science/article/pii/S0964569121000946>

Citation: Elrick-Barr, CE & Smith, TF, 2021, Policy is rarely intentional or substantial for coastal issues in Australia, *Ocean and Coastal Management*, 207.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Adaptive management is considered a valuable approach for managing complex and uncertain social-ecological systems. However, many obstacles hamper its implementation. Law is often seen as a barrier to adaptive management practice, but there is no synthesis of the legal constraints or how to overcome them.

How was it done?

We conducted a systematic literature review to examine the relationship between adaptive management and law. The literature sample (80 publications) was classified according to thematic categories (e.g. geographic context and main environmental concern). Through thematic coding, passages of text from publications were linked by common themes and ideas.

What did we find?

Scholarship addressing adaptive management and law has grown over recent years.

We found:

- Most literature (64%) had the United States as the geographical focus.
- Water management and biodiversity have received more attention than other fields of research, such as coastal management and fisheries.
- Primary data collection (e.g. interviews and surveys) is rarely undertaken (only 14% of literature) in studies examining the relationship between adaptive management and law.

Stationarity, certainty and finality are values adopted in law that hinder flexibility. Increasing legal flexibility has been suggested to allow for adaptive management.

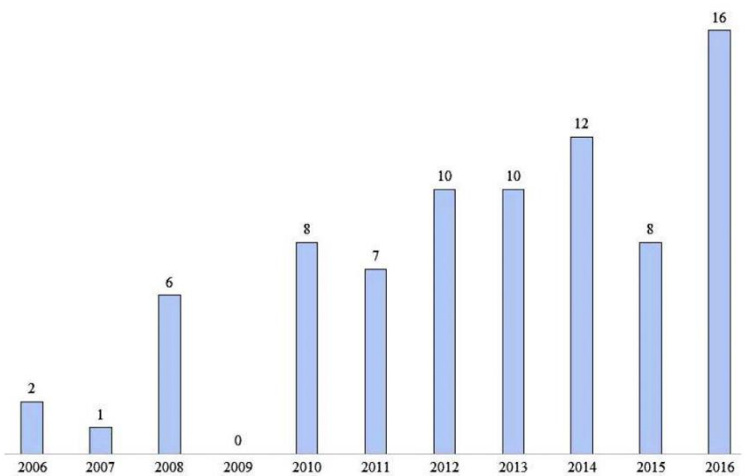


Figure 1: Number of articles by publication date.

What are the implications?

Overall, coupling adaptive management and law depends on balancing legal certainty and legal flexibility. Further research is needed to investigate this interplay, particularly in jurisdictions outside the United States. Research in developing countries and comparative studies could provide additional insight and improve knowledge of the role of law in adaptive management practice.

Want more information?

The full paper is available from: <https://doi.org/10.5751/ES-10060-230223>

Citation: Frohlich, MF, Jacobson, C, Fidelman, P, Smith, TF, 2018. The relationship between adaptive management of social-ecological systems and law: a systematic review. *Ecology and Society* 23(2):23.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Adaptive management is considered integral to Integrated Coastal Management (ICM). Yet, adaptive management practice has faced many challenges. In this study we examined the legal factors influencing adaptive management.

How was it done?

In Byron Shire, New South Wales, Australia, we investigated juridical constraints to adaptive coastal management. Belongil Beach, a coastal erosion hotspot in Byron Shire, was the focus of our case study. We analysed documents (i.e. legislation, case law, management documents, and academic publications) and interviewed 23 key informants, including government, non-government organisations, legal experts, and technical experts, to gain their perspectives on the legal barriers to adaptive coastal management.

What did we find?

Byron Shire has struggled with a *legal storm* which has produced three *waves* so far, each associated with an unsuccessful attempt by the local council to deliver a coastal management plan that adopts an adaptive management framework. Main juridical constraints to adaptive coastal management are:

- existing use rights attached to pre-1988 lawful coastal development, which have prevented the implementation of a coordinated and adaptive planned retreat policy. Enforcement of such a policy could only occur if coastal landowners are compensated on the basis of the current property market value; and
- court agreements entered into between the state and local governments and coastal landowners, which have created a layer of protection on existing *ad hoc* seawalls. Settlements were likely motivated by coastal landowners allegations that coastal protection works carried out by the local council in the 1960s aggravated erosion along Belongil Beach.



Figure 1: Existing seawall at Belongil Beach.

Current legal barriers have resulted in a reactive (rather than adaptive) approach to coastal management in Byron Shire.

What are the implications?

Our case study illustrates how an emphasis on legal certainty can create legacies and path dependencies that hinder adaptive coastal management. This research calls attention to the need for legal reform to better accommodate adaptive management in coastal management legislation.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.ocecoaman.2019.104909>

Citation: Frohlich, MF, Smith, TF, Jacobson, C, Fidelman, P, Carter, RWB, Baldwin, C, 2019. Towards adaptive coastal management: lessons from a “legal storm” in Byron Shire, Australia. *Ocean and Coastal Management* 179, 104909.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Adaptive management has been advocated as a fundamental principle of coastal management. However, its implementation is still limited. In this study, we investigated whether and how legal arrangements may constrain adaptive coastal management.

How was it done?

We examined legal barriers to adaptive coastal management in Florianópolis Brazil. Armação Beach, a coastal erosion hotspot in Florianópolis, was the focus of our case study. We analysed documents (i.e. legislation, case law, management documents, and academic publications) and interviewed 27 key informants, including government, non-government organisations, legal experts, and technical experts, to gain their perspectives on the legal barriers to adaptive coastal management.

What did we find?

Coastal management initiatives in Florianópolis have failed to follow the structured and iterative process of adaptive management. Vague, imprecise, and generic legal provisions have contributed to this outcome.

Given the open-ended nature of coastal management legislation, government entities have avoided making coastal management plans, which would have implications such as increased government spending, reduced government discretion on planning decisions, and conflicts with representatives of economic sectors and the electorate.

In this context, short-term defence strategies to manage coastal erosion have proliferated in response to crisis situations. Rather than adaptive coastal management, our results showed a predominance of reactive coastal management, with no commitment (or ability) to learn from management interventions.



Figure 1: Existing seawall at Armação Beach.

What are the implications?

Increased legal flexibility can help but also undermine adaptive management. The right balance between legal certainty and legal flexibility is required for adaptive coastal management. Findings of our study indicate further research on legal strategies to reach this appropriate balance is needed, as well as greater engagement with policy-makers and coastal stakeholders to reform coastal management legislation to facilitate adaptive management.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.marpol.2021.104436>

Citation: Frohlich, MF, Smith, TF, Fidelman, P, Baldwin, C, Jacobson, C, Carter, RWB, 2021. Legal barriers to adaptive coastal management at a coastal erosion hotspot in Florianópolis, Brazil. *Marine Policy* 127, 104436.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Flood and drought risks are increasing globally because of underlying social, economic, and environmental drivers. Understanding how countries and communities plan and prepare is critical to future disaster risk reduction and human development strategies.

How was it done?

This study systematically reviewed 147 peer-reviewed articles to assess the state of knowledge on pre-disaster planning and preparedness for floods and droughts in developed countries between 2005 and 2018. This included a review of the institutional frameworks, governance arrangements, and management strategies currently promoted in the context of floods and droughts.

What did we find?

As flood and drought risks continue to increase, it is important to approach governance and management through a more holistic lens. However:

- many countries are not engaging human development considerations consistently in disaster risk governance and emergency management;
- there is an over-reliance on technocratic solutions to manage flood risks in many countries, while droughts are managed through ad-hoc responses instead of through a disaster risk management framework; and
- planning and preparedness is moving towards a decentralized and privatized system, bearing more responsibilities on individuals and households for flood and drought risk management.

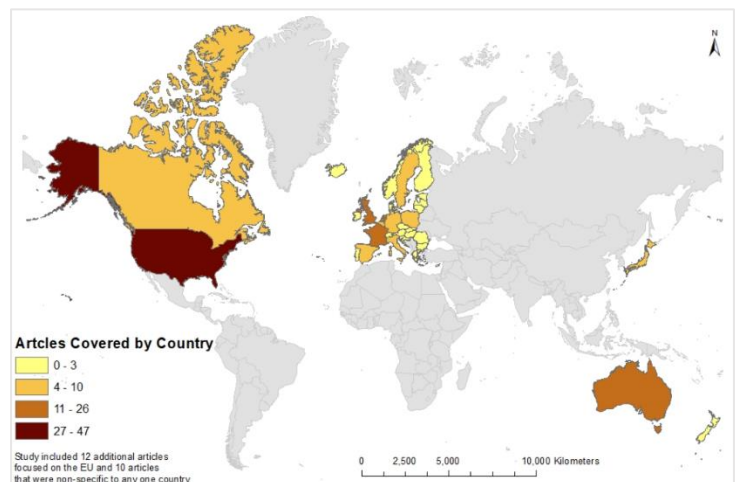


Figure 1: Pre-disaster planning and preparedness research in developed countries (2005-2018)

What are the implications?

Overall, disaster risk reduction is dependent on the broader systems that influence the impacts of floods and droughts. Past approaches to flood and drought risk management tend to underplay the roles and influences that these broader systems have on reducing these risks and improving disaster resilience. Research on the intersection between disaster risk reduction and human development in pre-disaster governance could provide an avenue for future policymaking, planning, and preparedness.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.ijdrr.2019.101207>

Citation: Raikes J, Smith TF, Jacobson C, & Baldwin C. 2019. Pre-disaster planning and preparedness for floods and droughts: a systematic review. *International Journal of Disaster Risk Reduction*, 38, 101207.

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Coastal Governance: Embracing Vulnerability and Change



Capacities and needs are important for flood and drought risk reduction

Why did we undertake this study?

Scientific and intergovernmental communities internationally have argued that a cross-pollination of disaster risk reduction and human development processes could lessen future flood and drought impacts. Yet, many of the social, economic, and political levers characterizing disaster risk reduction and human development are detached in governance and management.

How was it done?

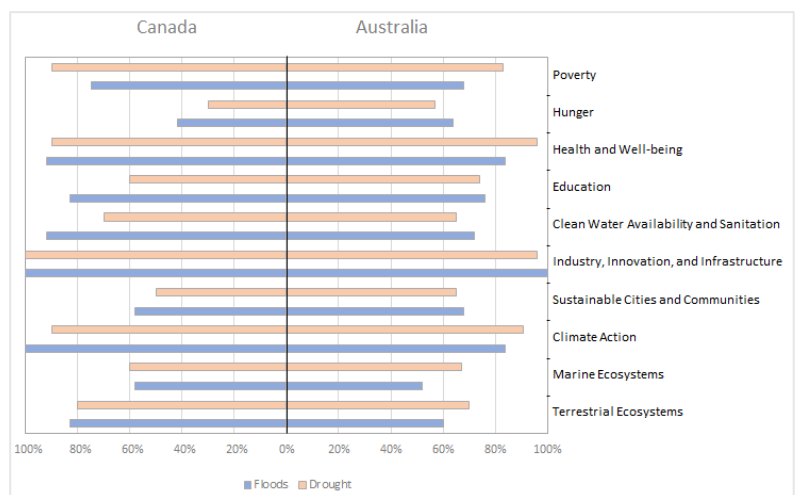
We surveyed and interviewed government practitioners in local, provincial/state, and federal agencies in Canada and Australia. We assessed their views on an integrated approach between disaster risk reduction and human development. Explored areas included: the importance of an integrated approach; the boundaries and requirements for an integrated approach; the role of human development in such a system; and the associated challenges in disaster risk governance.

What did we find?

Government practitioners suggested an integrated approach is a necessary step to improving disaster risk governance systems. In particular:

- Disaster risk reduction requires a broader engagement with human development systems in ways that are adaptable to local contexts, including targeting vulnerability and agency in planning and preparedness;
- Such arrangements must be reflected in legislative and policy frameworks, based on evidence, and extend across sectors and policy areas.

Our results show the importance of developing approaches to disaster risk governance that reflect the capacities and needs of individuals and vulnerable populations.



What are the implications?

Transitioning from traditional disaster management approaches towards innovations in disaster risk governance could increase disaster resilience in Canada and Australia. The findings of this study highlight the importance of transformative approaches to disaster risk governance that are centred on addressing vulnerability and human agency. Further research is needed on the efficacy of such approaches within the current systems across government jurisdictions and related policy areas.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.crm.2021.100291>

Citation: Raikes J, Smith TF, Baldwin C, & Henstra D. 2021. Linking disaster risk reduction and human development. *Climate Risk Management*, 32, 100291.

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Coastal Governance: Embracing Vulnerability and Change



Crisis management requires an approach that extends beyond traditional arrangements

Why did we undertake this study?

Global processes, such as climate change and international relations, are reshaping the characteristics and scales of modern crises, including the frequency and intensity of natural hazards (e.g., bushfires, floods, droughts) and geopolitical events (e.g., trade disputes, terrorism, conflict). Understanding how regions approach crisis management within this shifting global landscape for different hazards enables better planning and response.

How was it done?

We examined regional crisis management approaches to geopolitical events and natural hazards in the Sunshine Coast, Australia, and Gotland, Sweden. The study explored: (i) the governance arrangements for crisis management and related planning issues; (ii) the influence of community risk perceptions on institutional response capacities; and (iii) the potential value in approaching regional crisis management through a more holistic and global perspective.

What did we find?

Crises managed by local authorities are shaped by processes beyond their jurisdictional boundaries. Climate change, geopolitical tensions, and other processes challenge traditional management boundaries and approaches to crisis planning and response.

Consequently, future crisis management is dependent on: (i) improved public-private partnerships; (ii) increased public and political salience of potential crises; and (iii) planning approaches that take a more systemic approach to crises, including external factors (e.g. the geopolitical circumstances from local to international scales, and links between policy problems such as gender inequality and resulting domestic violence).



Figure 1: A need for evolving regional crisis management

What are the implications?

The findings suggest regional crisis management must approach planning and response through a more holistic and international perspective. As the global landscape for disaster risk and crises continues to shift, the preparedness and success of regional crisis management depends on how effective local governments are at adapting to changing circumstances and collaborating with stakeholders both within the local government area and beyond.

Want more information?

The full paper is available from: <https://doi.org/10.1111/1745-5871.12503>

Citation: Raikes J, Smith TF, Powell N, Thomsen DC, Friman E, Kronlid D, & Sidle R. (2021). Crisis management: A comparison of geopolitical crises and natural hazards. *Geographical Research*, 1-11

Acknowledgements

This research was supported by the Australian Government through the Australian Research Council Discovery Projects Funding Scheme (Project FT180100652) and a collaborative research grant from the Sunshine Coast Council and the University of the Sunshine Coast. The views expressed herein are those of the authors and the participants to this study, not necessarily those of the Sunshine Coast Council, the University of the Sunshine Coast, the Australian Government or Australian Research Council. This work contributes to Future Earth Coasts, a Global Research Project of Future Earth. We would like to thank participants for their contributions and acknowledge the significant contributions by John Gallina who is sadly missed.



Coastal Governance: Embracing Vulnerability and Change



Implementing international agreements for disaster risk reduction requires institutional changes

Why did we undertake this study?

There is global consensus that disaster risk reduction requires changes to the governance systems surrounding disaster risk, sustainable human development, and climate risk management. International agreements signed in 2015 provide a framework to facilitating and supporting these necessary changes in public policy and administration. How to maximize the value of these agreements in creating a transformative agenda requires an investigation into its current use by governments.

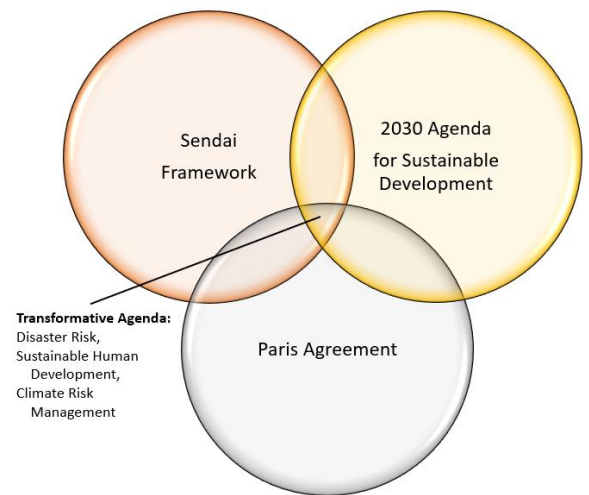
How was it done?

Surveys and interviews with practitioners in local, provincial or state, and federal governments in Canada and Australia were conducted between 2019 and 2020. Questions targeted how international agreements have changed and challenged current perceptions, arrangements, and practices related to disaster risk reduction.

What did we find?

Overall, international agreements are being underutilized:

1. There is a dominant view in Canada and Australia that international agreements reflect global principles for disaster risk reduction, sustainable human development, and climate risk management.
2. The agreements themselves do not necessarily account for national or local contexts given their global nature.
3. While there is an opportunity to use these types of agreements more meaningfully in the future, significant behavioural and institutional changes are needed at all government levels to contextualise and integrate the agreements into policy and practice.



What are the implications?

Transforming disaster risk management requires that connections between international agreements and public policies are fully realized by those negotiating agreements and responsible for implementation. This must involve greater recognition that the principles espoused in these agreements have value to national and local disaster risk reduction. Recommendations include: expanding stakeholder engagement processes; being more proactive in linking existing and future policies and programs with international principles and requirements; and more communicating the value of international agreements to local and regional governments.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.ijdrr.2022.102999>

Citation: Raikes, J., Smith, T.F., Baldwin, C., & Henstra, D. (2022). The influence of international agreements on disaster risk reduction. *International Journal of Disaster Risk Reduction* 76: 102999.

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Coastal Governance: Embracing Vulnerability and Change



Disaster risk reduction requires systemic change for effective emergency management

Why did we undertake this study?

Disaster risk reduction and climate policy are central to emergency planning and preparedness, but whether current policies reflect international best-practice is uncertain. Critical examination of policies, planning and preparedness in light of global debates can identify areas where disaster risk reduction and climate risk management can be improved.

How was it done?

We examined the policy context for disaster risk reduction in Canada and Australia and its application to flood and drought planning and preparedness. We analysed 71 government documents and consulted practitioners at local, provincial/state, and federal levels.

What did we find?

Major findings of this study include:

- Disaster risk reduction in emergency management policy reflects international discourse by emphasising an 'all-hazards' and 'whole-of-society' response, with targeted interventions aimed at vulnerable groups.
- Policy implementation is constrained by internal (e.g., institutional silos) and external conditions (e.g., competing interests from non-government stakeholders).
- Short- and long-term disaster risk reduction and climate risk management will likely be constrained by development patterns and priorities (e.g., economic growth) that often supersede proactive emergency management.

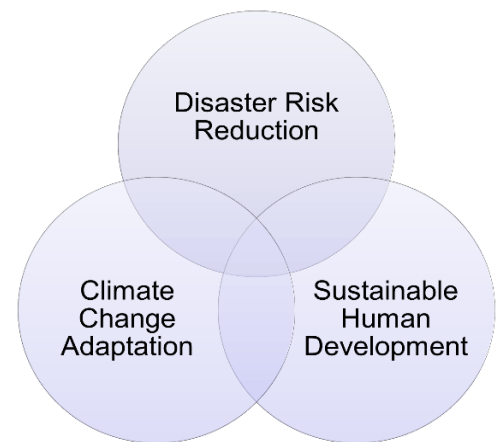


Figure 1: The importance of approaching emergency management more holistically

What are the implications?

Disaster risk reduction is influenced by policies and decisions outside of emergency management. Despite emergency management policies reflecting international best-practice, systemic changes to public policy and administration are necessary to avoid gaps in planning and preparedness. For example, disaster and climate vulnerabilities should be integrated and mainstreamed into existing legislative and decision-making frameworks spanning government mandates, including in emergency management, natural resource management, and economic development. Without systemic change in disaster and climate risk management, existing vulnerabilities for communities and vulnerable groups will increase. Further research is needed to better understand the mechanisms through which systemic change can occur at all levels of government.

Want more information?

The full paper is available from: <http://dx.doi.org/10.1080/14693062.2022.2048784>.

Citation: Raikes, J., Smith, T.F., Baldwin, C., & Henstra, D. (2022). Disaster risk reduction and climate policy implementation challenges in Canada and Australia. *Climate Policy*.

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This research was supported by the Australian Government through the Australian Research Council Discovery Projects Funding Scheme (Project FT180100652). This work contributes to Future Earth Coasts, a Global Research Project of Future Earth. The views expressed herein are those of the authors and are not necessarily those of the Australian Government, Australian Research Council or Future Earth Coasts. We would like to thank the participants for their time and contributions, as well as Professor William (Bill) Carter (University of the Sunshine Coast), Cathy Buck (Sunshine Coast Council), and Alison Rifai (Queensland's Inspector General's Office for Emergency Management).



Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Coastal zones are at the forefront of the impacts of climate change and households play an important role in reducing vulnerability through individual and collective action. Governments provide information to households to facilitate their adaptation. However, there is limited evidence of the effectiveness of this strategy. This study examined the types of information guiding household response to climate risks.

How was it done?

Households in two peri-urban Australian coastal communities (Mandurah, Western Australia and Moreton Bay, Queensland) were surveyed (n=400) to gain their perspectives on the usefulness of climate information; and interviewed (n=17) to explore their response to climate hazards (severe storm, sea-level rise and heatwave). The information sources that informed household response were coded into one of three types: (i) passive information (hazard and preparedness education material); (ii) interactive information (derived through interactions with other people); or (iii) experiential information (from personal life experiences).

What did we find?

The key strategy adopted by governments to engage civil society in adaptation (ie. the provision of passive information) is not working.

- <50% of households used passive information, and when adopted, it mostly informed coping strategies.
- Experiential information or 'common sense' informed action in most households, but similarly mainly informed coping strategies.
- Further research is needed on the link between information and more than coping responses (i.e. adaptation and collective action).



Figure 1: Goldcoast Hwy, Mainbeach, QLD. Photo by [Patrick Ryan](#) on [Unsplash](#)

What are the implications?

The importance of civil society's engagement in adaptation will intensify as the impacts of climate change continue to be felt. Current emphasis by authorities on passive information provision is unlikely to facilitate adaptation. Decision makers need to consider novel and diverse information channels if households are to transition from coping to adaptation.

Want more information?

The full paper is available from: <https://www.mdpi.com/2071-1050/14/5/2904/pdf>

Citation: Elrick-Barr, C.E.; Smith, T.F. (2022) Current Information Provision Rarely Helps Coastal Households Adapt to Climate Change. *Sustainability*, 14, 2904. <https://doi.org/10.3390/su14052904>

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This research was supported by the Australian Government through the Australian Research Council Discovery Projects Funding Scheme (Projects FT180100652 and DP1093583). This work contributes to Future Earth Coasts, a Global Research Project of Future Earth. The views expressed herein are those of the authors and are not necessarily those of the Australian Government, Australian Research Council or Future Earth Coasts.



Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Lack of public support for coastal adaptation can present significant barriers for implementation. Building public support for coastal adaptation first requires a deeper understanding of peoples' preferences for coastal adaptation and what motives those preferences.

How was it done?

A systematic literature review was conducted to understand preferences for coastal adaptation options and the factors influencing these preferences. Ninety peer-reviewed publications consisting of 121 case studies from the years 2007 and 2020 were reviewed. A questionnaire was applied to record types of adaptation studied, findings on public preference, and details on the potential factors influencing preference for each empirical case study.

What did we find?

Research on perceptions of coastal adaptation have been steadily increasing in the fourteen-year period covered in the review. Research emphasis has been on public views of managed retreat, and developed country contexts.

- Hard protection options were often the most frequently preferred, due to a desire to maintain current shoreline, to protect recreational spaces and private property, and perceived effectiveness.
- Retreat options were the least preferred, often due to strong place attachment.
- Twenty-eight factors influencing preferences were identified, including risk perception, place attachment, and financial considerations.

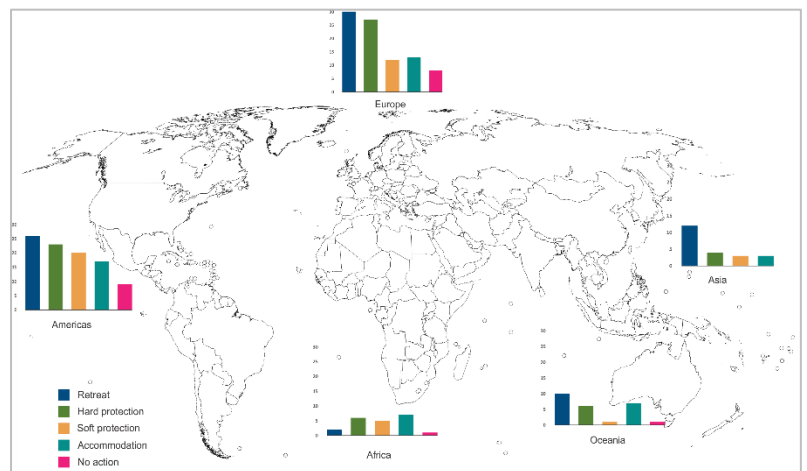


Figure 1: Bar graphs display the frequency count each category of adaptation was studied in each region

What are the implications?

For practitioners aiming to implement coastal adaptation, the findings suggest potential leverage points in which the option has more positive sentiment; for example, restricting future development in at-risk areas. Recognizing that each case is context-specific, and that any considerations of preferences should occur on a local scale, planners and policy makers should consider local preferences (what) and the factors influencing preferences (why). This will foster policy that respects the values of communities and supports communication with diverse audiences.

Want more information?

The full paper is available from: <https://www.mdpi.com/2071-1050/13/15/8594>

Citation: Mallette, A.; Smith, T.F.; Elrick-Barr, C.; Blythe, J.; & Plummer, R. 2021. Understanding Preferences for Coastal Climate Change Adaptation: A Systematic Literature Review. *Sustainability*, 13(15):8594. <https://doi.org/10.3390/su13158594>

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

The urgency of climate change and its impacts to coastal systems means adaptation is necessary; but there is often tension regarding which adaptation options should be implemented based on social, economic and environmental grounds. Understanding public support for coastal adaptation is critical in addressing barriers faced in transitioning from adaptation planning to implementation. However, there is currently limited knowledge regarding the factors that shape public preferences for different coastal adaptation options.

How was it done?

We explored preferences for coastal adaptation and the underlying factors, determinants, and rationales behind those preferences. A questionnaire followed by semi-structured interviews in two coastal case study communities (Yeppoon, Queensland, Australia and Shediac, Canada) were undertaken to determine whether the determinants shaping public preferences for coastal adaptation align or differ across contexts.

What did we find?

Soft adaptation measures, specifically nature-based solutions and emergency preparation and development restrictions are highly supported options.

- There is a decline in public support for hard adaptation options due to concerns regarding their possible maladaptive impacts.
- Residents pragmatically prioritise solutions that are **effective** for their local area with recreational concerns, costs, political outcomes, and property concerns, less important.
- The ecological impacts of adaptation measures are one of the most important issues for the public when deciding which adaptation measure they will support, on par with efficacy of the adaptation option.

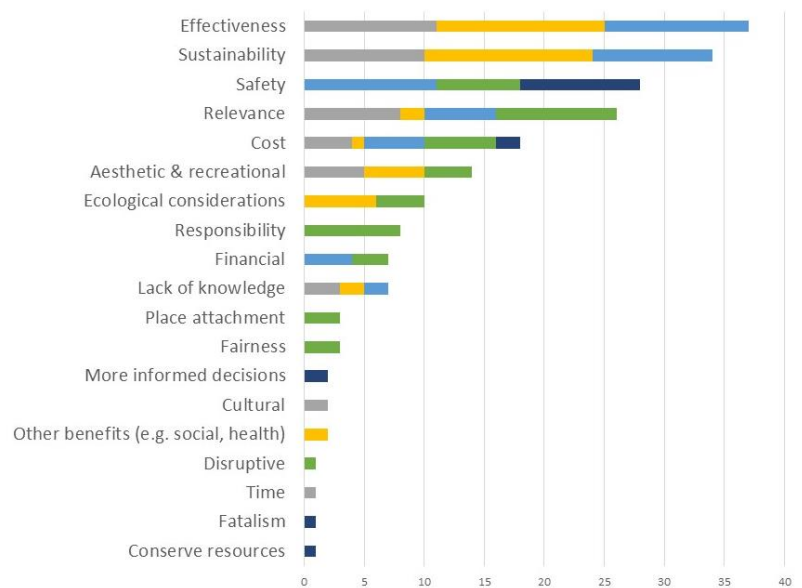


Figure 1: Factors influencing public adaptation preferences

What are the implications?

By examining several drivers for adaptation support simultaneously, this study provides insights into their relative importance. Decision-makers should provide communities with more information on the effectiveness and ecological impacts of different adaptation options to help in their planning. By facilitating community discussion to understand perspectives on effective/sought after outcomes, decision-makers can optimise the advantages and disadvantages of different options in meeting those outcomes.

Want more information?

The full paper is not currently available online. Keep an eye on the project website for updates.

Citation: Mallette A, Plummer R, Elrick-Barr C, Smith T, Bythe J (forthcoming) Developing a comprehensive understanding of support for adaptation measures in coastal regions: case studies from Canada and Australia, *further details forthcoming*

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This research was supported by the Australian Government through the Australian Research Council Discovery Projects Funding Scheme (Project FT180100652). This work contributes to Future Earth Coasts, a Global Research Project of Future Earth. The views expressed herein are those of the authors and are not necessarily those of the Australian Government, Australian Research Council or Future Earth Coasts.



Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

As climate change threatens our coasts, adaptation is required, both in response to rapid (e.g., storms) and slow-onset (e.g., sea-level rise) impacts. In practice, certain adaptation measures are preferred based on the speed of the hazard. But what does the general public think? As research on coastal adaptation progresses, increasingly public support for adaptation becomes a focal point. Yet, it remains unclear whether or how individual support for coastal adaptation change between different hazards.

How was it done?

This study employed an online questionnaire followed by semi-structured interviews with residents in two small coastal settlements: Shediac, Canada and Yeppoon, Australia. Presented with different hazard scenarios, residents were asked to rate their support for a series of adaptation options for each scenario.

What did we find?

In both case study areas, residents rarely changed their levels of support for adaptation options between rapid and slow-onset events; however, accommodation options, such as emergency preparation and floodproofing, have less support for use in responding to slow-onset scenarios. The decrease in support for accommodation options could be due to perceptions that they are unsustainable.

Preferences remain unchanged largely in line with a perception that the risks will remain unchanged, either due to a failure to perceive the risks associated with slow-onset hazards, or the perception that sea-level rise will exacerbate risks associated with rapid-onset hazards.

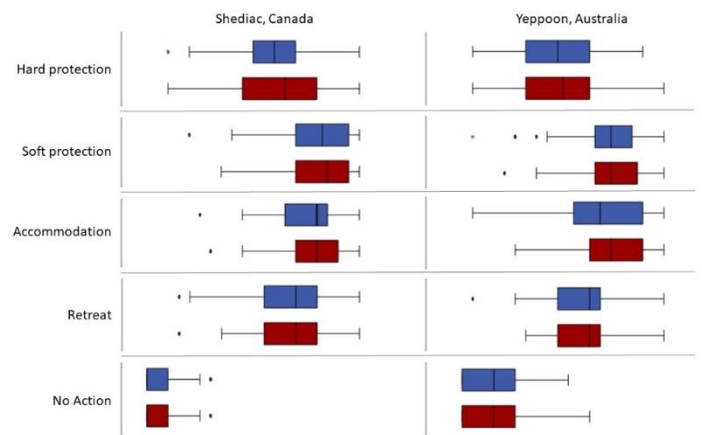


Figure 1: Boxplots representing favourability for each category of coastal adaptation for a rapid-onset scenario (red) and slow-onset scenario (blue)

What are the implications?

The findings have implications for adaptation planning. Distinguishing adaptation between rapid and slow-onset events is crucial due to their distinct timescales, levels of certainty, and systems they affect. Residents' limited differentiation in how adaptation should occur reflects a lack of certainty or understanding and highlights potential areas for communicating how slow-onset events may require different approaches. In addition, individuals are not deferring retreat to the future, which is a common assumption. The fact that residents believe the same measures will work for rapid events and sea-level rise suggests they are not recognising the permanency of sea-level rise. Practitioners should consider emphasising the connection between sea-level rise and retreat.

Want more information?

The full paper is not currently available online. Keep an eye on the project website for updates.

Citation: Mallette A, Smith TF, Elrick-Barr CE, Blythe J, Plummer R (forthcoming) Residents' preferences for coastal adaptation rarely change between rapid and slow-onset scenarios, *further details forthcoming*.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Climate change adaptation planning and action are impeded by planning under uncertainty and community resistance to change. The concept of ‘the solution space’ refers to flexibility in the choice of adaptation options, and is associated with improved coastal resilience. Public support shapes the boundaries and size of the solution space by determining how many and what type of solutions are socially acceptable at any given time. But research on individual support for adaptation is rarely considered in this way.

How was it done?

Surveys and interviews with residents in two coastal settlements (Yeppoon, Australia and Shediac, Canada) were undertaken to explore individual support across different adaptation options and the inclination to consider a range of options or to prioritise one option.

What did we find?

Rather than focusing on a single best adaptation option, residents generally support several adaptation options simultaneously (see figure).

- Socio-demographic (e.g., age, political association) and cognitive (e.g., beliefs, worldviews) attributes do not explain differences in an individual’s solution space.
- While individuals may appraise adaptation options based on costs or aesthetics, this is less impactful on the size of their solution space than an individual’s philosophies and perspectives on how adaptation should occur.
- Those individuals that prefer a limited number of options (i.e., with a smaller solution space) are also those more inclined to consider alternative options if provided adequate information (e.g., are flexible in changing their preferences).

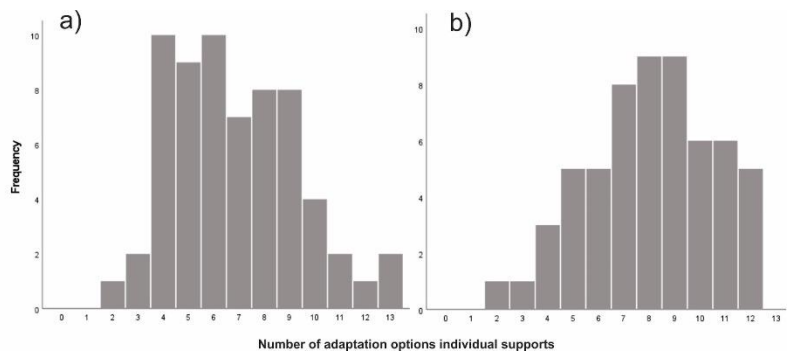


Figure 1: Number of adaptation options an individual supports, a) Yeppoon; b) Shediac

Residents acknowledge the importance of a wide solution space and typically endorse diversifying options in the face of uncertainty: to implement the most appropriate option today, with the potential to change tomorrow.

What are the implications?

Contrary to conventional preference surveys that might emphasise a single ‘top’ solution or what might appear to be a community’s limited preferences, this study indicates that individuals are not limited to endorsing just one option. Even those with a smaller solution space are open to considering more adaptation options if their effectiveness and utility can be demonstrated. Therefore, by providing residents with more information there is the capacity to expand the solution space and increase community resilience.

Want more information?

The full paper is not currently available online. Keep an eye on the project website for updates.

Citation: Mallette A, Elrick-Barr C, Smith T, Blythe J, Plummer R (TBC) Broadening the solution space for coastal adaptation: Residents’ inclination to support a range of pathways, *further details forthcoming*.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

The interplay between adaptive management and law is not well understood, particularly in coastal management, and there have been calls for more case studies to explore legal frameworks across jurisdictions. We analysed if and how legal frameworks for coastal management facilitate or hinder adaptive management in Australia and Brazil.

How was it done?

We analysed documents (i.e. legislation, case law, management documents, and academic publications) and conducted 50 semi-structured interviews with key informants in Byron Shire (Australia) and Florianópolis (Brazil) to capture their perspectives on the legal barriers to adaptive coastal management.

What did we find?

Legal certainty and legal flexibility influence the success of adaptive coastal management. We proposed three ways to integrate adaptive coastal management and law:

- Incorporate the structured and iterative process of adaptive management into coastal management laws and regulations by: (i) improving legal provisions concerning stakeholder involvement and participation; (ii) clear objective setting; (iii) assessment of management alternatives; and (iv) monitoring and evaluation;
- Address legal path dependencies that cause maladaptation, such as the negative effects of existing use rights and instead allow for the review of past legal decisions based on lessons learned through adaptive management; and
- Better integration of adaptive coastal management law mechanisms, such as legal provisions that stimulate polycentricity.

In pursuing these directions, attention is needed on legal flexibility that enables effective and quick actions in response to change, but also on legal certainty for implementing such actions through clear and structured decision-making processes that provide for stability and accountability.



Figure 1: Coastal erosion hotspot at Armação Beach.

What are the implications?

Our proposed directions contribute to improved adaptive coastal management law by emphasising the need for an optimal balance between legal flexibility and legal certainty. Our research may also prove useful to other jurisdictions considering more adaptive approaches to coastal management.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.ocecoaman.2022.106057>

Citation: Frohlich, M, Smith, TF, Fidelman, P, Baldwin, C, Jacobson, C, Carter, RWB, 2022. 'Towards adaptive coastal management law: Lessons from Australia and Brazil', *Ocean & Coastal Management* 219, 106057.

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This research was supported by the Australian Government through the Australian Research Council Discovery Projects Funding Scheme (Project FT180100652) and a Research Training Program (RTP) scholarship. This work contributes to Future Earth Coasts, a Global Research Project of Future Earth. The views expressed herein are those of the authors and are not necessarily those of the Australian Government, Australian Research Council or Future Earth Coasts.



Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Critical infrastructure underpins a functioning society – but what is critical infrastructure, and how is it becoming adaptive to climate change? Critical infrastructure, such as water services, transport networks and hospitals, are vulnerable to the impacts of climate change. Although it is the consensus that critical infrastructure systems must adapt to these changes, what comprises ‘critical infrastructure’, how it becomes adaptive, and the implications of this are unclear.

How was it done?

We examined critical infrastructure literature for methods and approaches to adaptation. Over 84 peer-reviewed publications were reviewed to determine how critical infrastructure is conceptualised and how climate change adaptation is being applied to critical infrastructure systems. Each article was analysed against a set of criteria to uncover themes in adaptation approaches.

What did we find?

There is no consistent definition of critical infrastructure and the application of climate change adaptation to critical infrastructure systems is fragmented. Key findings include:

- There are four types of critical infrastructure: physical, ecological, institutional and cultural.
- Critical infrastructure adaptation is conceptualised according to the following themes: worldview, tangibility, threat characterisation, adaptation objective and the roles of actors. These themes were arranged in a typology (Fig. 1).
- The conceptualisation of adaptive critical infrastructure has implications for the expected and realised outcomes of adaptation actions.

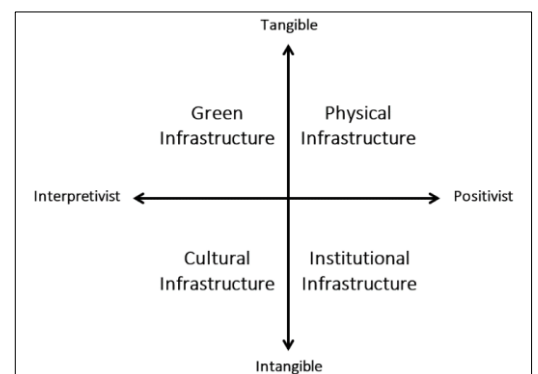


Figure 1: Typology of adaptive critical infrastructure

A definition for adaptive critical infrastructure was developed that incorporates the different types of infrastructure, and the importance of outcomes: *Adaptive critical infrastructure comprises tangible and/or intangible systems that are vital for supporting human life, and necessary to achieve social, cultural, economic and environmental outcomes.*

What are the implications?

The proposed definition presents an outcomes-based approach to classifying adaptive critical infrastructure and encompasses both tangible and intangible systems. The development and prioritisation of relationships (e.g. between physical assets or between people and their environment) can influence the adaptiveness of critical infrastructure. The relationships infrastructure practitioners choose to focus on will direct what climate change adaptation outcomes are achieved.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.envsci.2022.04.015>

Citation: Huddleston, P., Smith, T., Elrick-Barr, C., & White, I. (2022). Adaptive critical infrastructure: a scoping review. *Environmental Science & Policy*, 135: 67-76

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Critical infrastructure (CI) underpins a functioning society. Although the consensus is that CI systems must adapt to climate change, how CI providers are set up to take adaptive action is unclear. Looking at the adaptive capacity of CI providers gives insight into the decisions and resources that influence the adaptability of CI.

How was it done?

We conducted a multi-national survey in Australia and Aotearoa-New Zealand of CI providers to gather their perceptions of their organisations capacity to adapt to climate change. The survey responses were analysed using the Adaptive Capacity Wheel developed by Gupta, et. al (2010), which allowed for an assessment of current levels of adaptive capacities. Themes, patterns and path dependencies emerged through analysis of the quantitative and qualitative responses.

What did we find?

When scores of adaptive capacity are averaged, critical infrastructure providers in Australia and Aotearoa-New Zealand appear to be in a good position to adapt to climate change. However, averages obscures variation. We found:

- Those in executive management positions perceive the level of adaptive capacity to be higher than those at lower organisational levels.
- Leadership was overwhelmingly recognised as the most important element of adaptive capacity.
- Meaningful climate change adaptation must begin with assessing the leadership capabilities of the people making strategic infrastructure decisions.
- Climate change policy must acknowledge, and enhance, the leadership capacities of critical infrastructure providers.

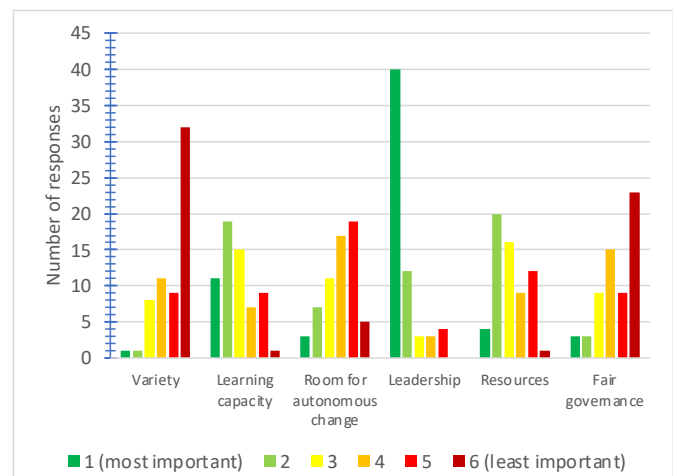


Figure 1: Perceived importance of dimensions of adaptive capacity for critical infrastructure providers

What are the implications?

Assessing the adaptive capacity of decision makers within CI organisations is pivotal to meaningful adaptive actions. For example, if the leaders within CI provider organisations are not able or inclined to collaborate with multiple diverse perspectives or to innovate, it is unlikely the organisation and therefore critical assets, can adapt to climate change in the timeframes needed. Policy settings that facilitate outcomes-based decision-making will give CI providers, and their leaders, the direction needed to adapt.

Want more information?

The full paper is available from: <https://www.sciencedirect.com/science/article/abs/pii/S221209552300010X>

Citation: Huddleston, P., Smith, T., White, I., & Elrick-Barr, C. (2023). What influences the adaptive capacity of coastal critical infrastructure providers? *Urban Climate*, 48: 101416.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

The impacts of climate change in the coastal zone (e.g., erosion and inundation) threaten critical infrastructure, with implications for the health and wellbeing of many coastal communities in Australia and New Zealand. The ability to adapt critical infrastructure is imperative to responding to these impacts. While critical infrastructure providers have the capacity to adapt, there is a concerning lack of adaptive action. This study sought to understand the barriers to mobilising adaptive capacity to take adaptive action in this sector.

How was it done?

A selected sample of critical infrastructure providers from Australia and New Zealand were interviewed. All interviewees were in a leadership role, whether that be a senior engineer or a department lead. Participants were asked about their existing processes to respond to the impacts of climate change and their views on perceived barriers and enablers to climate change adaptation.

What did we find?

Although there is an ability and motivation to adapt to climate change, institutionalised risk-aversion, regulations, and a dependence on political priorities are barriers. Participants themselves demonstrated a will to be visionary, entrepreneurial and innovative but:

- Limited resourcing means climate change adaptation projects are side-lined in favour of essential works.
- The heavily regulated and process-orientated institutions they operate within limits their ability to exercise their capacities.

The institutions that house critical infrastructure systems are hierarchical, conservative, consistent, and inherently resistant to change. Funding models that prioritise emissions mitigation and maintaining the status quo over proactive replacement of failing assets also constrain adaptive action.

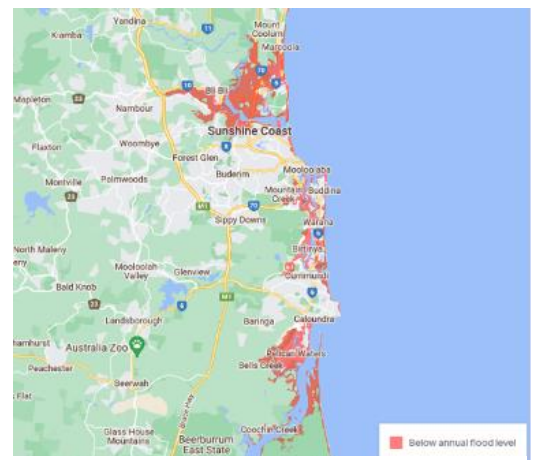


Figure 1: Map showing extent of sea level rise on the Sunshine Coast (Climate Central, 2023)

What are the implications?

Critical infrastructure providers with coastal assets are at the forefront of climate change impacts. Limited climate change adaptation is the result of past and contemporary decisions and values that have constructed rigid systems and a reliance on the status quo. Embedding more adaptive attributes, such as autonomy to change and innovate, within the critical infrastructure sector will give providers more autonomy over their organisational cultures and functions. This may be the catalyst to take providers from the leading edge of climate change adaptation.

Want more information?

The full paper is not currently available online. Keep an eye on the project website for updates.

Citation: Huddleston P, Smith TF, White I, Elrick-Barr C (forthcoming), Leading edge or bleeding edge: mobilising adaptive capacity in coastal critical infrastructure providers, *further details forthcoming*.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Building community capacity to respond to change is integral to reducing vulnerability and achieving sustainable development. Yet scholars lament the divide between adaptive capacity research and uptake in policy and practice. In this commentary, we drew on highly-cited adaptive capacity scholarship to identify gaps in understanding that inhibit policy uptake, and resultingly, efficient and effective capacity building interventions.

How was it done?

Highly cited peer-reviewed literature addressing adaptive capacity published between 2007 and 2020 was analysed to explore whether the dynamic nature of adaptive capacity was addressed in scholarship. Forty-nine highly-cited papers were incorporated in the review. For each paper, we profiled its: objective, geographic scope, sector, scale, conceptualisation of adaptive capacity, measurement, dynamism, and identified challenges or gaps.

What did we find?

To date, complexity and dynamism has been incorporated in adaptive capacity scholarship in three ways:

- (i) examining trade-offs between determinants of capacity;
- (ii) acknowledging structures and processes shape capacity; and
- (iii) describing adaptive capacity as a set of dynamic attributes

These approaches acknowledge that: the importance of assets is relative to the adaptation goal; cross-scale interactions influence stocks of capacity; and determinants of adaptive capacity are not static. Yet focus remains on the processes that define an individual’s access to stocks of capacity. The dynamic processes by which collective capacity are enhanced or diminished are neglected.

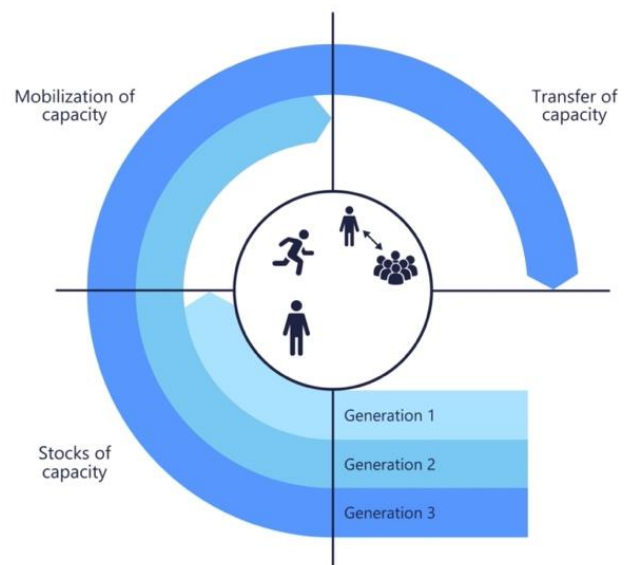


Figure 1: Multigenerational view of adaptive capacity

What are the implications?

Limits to conceptualisation mean interventions to address shortfalls in capacity involve top down, short term, and ad hoc measures; for example, the provision of financial capital to individuals. Broadening focus beyond assessing the stocks of capacity available to an individual and how those stocks are mobilised, to consider the movement of capacity between individuals and groups, offers an opportunity to modify the processes that define stocks and provide more sustained and enduring capacity benefits.

Want more information?

The full paper is available from: <https://www.tandfonline.com/doi/abs/10.1080/17565529.2022.2117978?journalCode=tclcd20>

Citation: Elrick-Barr CE, Plummer R & Smith TF (2022) Third-generation adaptive capacity assessment for climate-resilient development, *Climate and Development*, DOI: [10.1080/17565529.2022.2117978](https://doi.org/10.1080/17565529.2022.2117978)

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Hope promotes a positive attitude toward the future that can incentivise action. The challenges facing coastal communities are immense and within this context it is unclear if vulnerability managers are optimistic for the future of the coast, or despair at its decline. Further, it is unclear how these perceptions influence implementation of the significant reforms in coastal governance called for to address the challenges faced. This commentary asked this question using coastal governance in Australia as a case example.

How was it done?

We drew on the results of semi-structured interviews with coastal managers and community service providers who work in the most rapidly growing coastal communities in Australia; and explored the presence of hope in narratives of coastal governance and vulnerability using qualitative analysis methods (i.e., text search and thematic analysis).

What did we find?

When reflecting on coastal governance, vulnerability, and the needs of their community, we found strong positive narratives of hope.

- Coastal managers hoped existing practices and processes would achieve coastal governance goals - and the goals of coastal governance aligned to good practice coastal governance (Fig).
- Community service providers hoped for change in the systems and processes that determine vulnerability.

Narratives of hope were rarely accompanied by active plans for change. Passive approaches (e.g., seeking change by the community or following extreme events) dominated. Passivity is not a function of the will or drive of those managing vulnerability to deliver change, rather it is a function of embeddedness within socio-institutional systems (politics, economics) that constrain change.

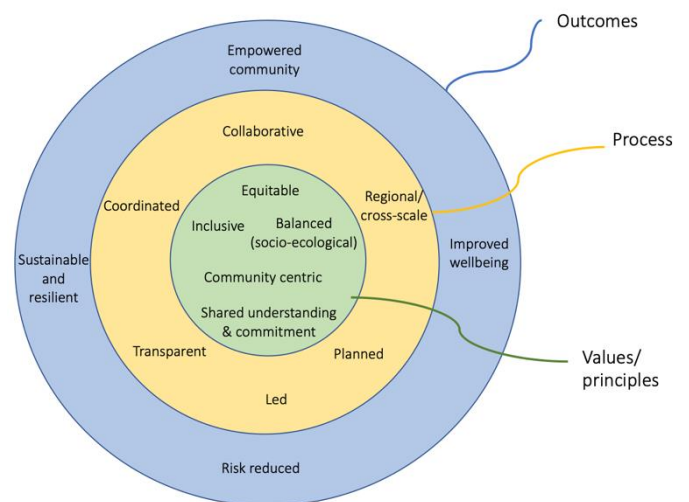


Figure 1: Goals of coastal governance as defined by vulnerability practitioners

What are the implications?

To leverage narratives of hope to achieve transformational change hopeful frames must be accompanied by a clear understanding of the elements vital to their success – *policy* and *community*. Structural (policy) change and individual action can alter the values and norms that constrain reform in coastal governance. But such change will take time and effort - the time to start is now. There is the need to accept difficult discussions, the likelihood of disputes and have the strength to challenge the status quo, because only through the presence of change agents will hopeful futures come to fruition.

Want more information?

The full paper is available from: <https://doi.org/10.1016/j.ocecoaman.2023.106953>

Citation: Elrick-Barr CE, Smith TF, Thomsen DC (2023), Is ‘hope’ helpful or a hinderance? Implications for coastal governance, *Ocean and Coastal Management*, 248: 106953.

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Coastal Governance: Embracing Vulnerability and Change



Why did we undertake this study?

Coastal communities are facing unprecedented risks due to population growth, urbanisation, and climate change. Innovation is key to supporting transformational change; yet is not a novel concept in the coastal zone. Past innovations have rarely considered social and ecological systems or reflected best practice integrated coastal zone management. Consequently, a deeper focus on human-environmental interactions and feedbacks to better understand the capacity for innovation is called for. This study met this call.

How was it done?

We conducted semi-structured interviews with 68 coastal and community key informants in Australia’s most rapidly growing coastal communities. Interviews discussed themes of vulnerability, coastal governance, innovation, and community need. Inductive and deductive thematic analysis of interview transcripts was undertaken.

What did we find?

Despite the high levels of individual capacity held by vulnerability managers, and the presence of good-practice policy, most innovations are limited in scale and insufficient for transformative change. Barriers to innovation were immense and reflected familiar barriers to best practice governance and change generally. Nevertheless, a small number of exemplars avoided barriers by:

- Implementing multi-sectoral, integrated strategies that were mutually beneficial and reflected a broad commitment to sustainability.
- Drawing upon extensive place-based or sectoral experience (>20 years)

Individual and community capacity for innovation was built prior to crisis events and consisted of experience/knowledge, extensive and diverse social networks, and resource mobilisation skills.

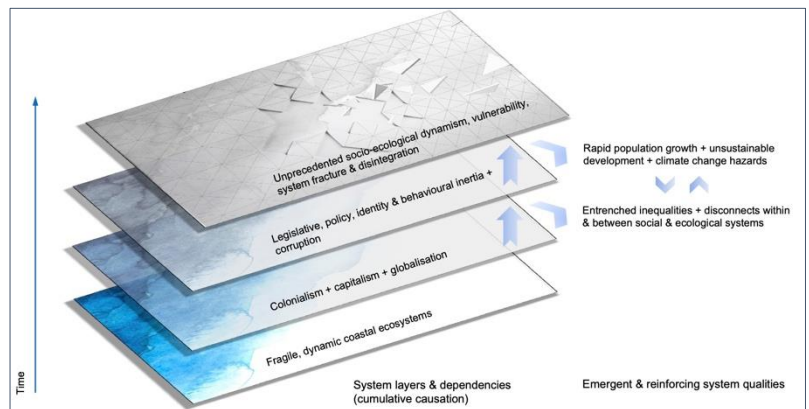


Figure: Historic and cumulative drivers of inequity and vulnerability, and feedback loops, in coastal Australia

What are the implications?

Individual and community capacity, and the ability to span boundaries (work across sectors) to achieve common, sustainability focussed, goals, facilitates innovation. A key barrier to innovation is emphasis on physical coastal vulnerability (neglecting social vulnerability) that frames the actions of public, private, and civil society actors and impedes cross-sectoral collaboration. For integration to work a long-term vision of the coast is needed; one that addresses its social-ecological conditions more comprehensively, to develop systemic, rather than single sector/impact, solutions.

Want more information?

The full paper is not currently available online. Keep an eye on the project website for updates.

Citation: Elrick-Barr C, Thomsen D, Smith T (forthcoming). Governance innovations in the coastal zone: Towards social-ecological resilience, *Environmental Science and Policy*, further details forthcoming

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Coastal Governance: Embracing Vulnerability and Change

