Adaptation actions and policy... continued

1. Develop new strategies or language for dealing with arbitrary lines and benchmarks.
2. With the right tools: Communication, capacity building, knowledge exchange and contextual support will improve application and help ensure fitness for purpose.
3. Coastal planning systems that can embrace and plan for competing pressures and demands, can avoid knee-jerk reactions to disaster and can seek to achieve a balance between people and the natural environment.
4. Coastal management which can deal with multiple demands and hazards;
5. Coastal planning systems that can anticipate and plan for competing pressures and demands, can avoid knee-jerk reactions to disaster and can seek to achieve a balance between people and the natural environment.
6. Provide local governments with the authority to act.
7. At the right time and the right level: Subsidiarity, flexibility, timeliness.
8. Building in climate change adaptation into day-to-day local government operations.
9. Embedding climate change adaptation into day-to-day local government operations.
10. There is currently a lack of clarity as to who is the “coastal manager”.

With the right tools: Communication, capacity building, knowledge exchange

11. Develop a planning system that is flexible enough to deal with multiple demands and hazards.
12. Coastal management which can deal with multiple demands and hazards;
13. Coastal planning systems that can anticipate and plan for competing pressures and demands, can avoid knee-jerk reactions to disaster and can seek to achieve a balance between people and the natural environment.
14. Coastal planning systems that can anticipate and plan for competing pressures and demands, can avoid knee-jerk reactions to disaster and can seek to achieve a balance between people and the natural environment.
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Approach

The policy guidance provided in this brief was developed at a regional workshop held in Northern NSW. The workshop was attended by policy makers and managers from NSW Government, several NSW Councils, Northern Rivers CMA, four academics working on coastal zone management, Prof Bruce Thom (from The Wentworth Group), and NCCARF staff.

References

Building resilient coastal communities and ecosystems

Key Points

Coastal managers face the challenges, on the one hand, of future climate change and sea-level rise and, on the other, of increased development demands, infrastructure planning, renewal and maintenance, and environmental protection. Effective management of the coastal zone by local governments under climate change and sea-level rise requires:

• consistent guidance from state and federal government on how coastal zones should be managed, with legislative support that links land-use planning, conservation and hazard protection. This includes clear guidance on the circumstances under which development should not be approved;
• systems that provide local governments with the authority to ensure compliance, and
time and investment in knowledge, capacity and resources to transition local governments successfully to this new paradigm. Such frameworks allow local governments to embed adaptation to climate change into their day-to-day operation and effectively manage the coastal zone under climate change.
NCCARF’s evidence-based Policy Guidance Briefs address key challenges to effectively adapting Australia to a variable and changing climate, providing high level policy guidance designed for use by policy makers at Commonwealth and State level. This Guidance Brief deals with coastal management under climate change. It is built upon the experience of New South Wales, but is relevant to planning for the coastal zone throughout Australia.

The climate context

The principal risks to people and infrastructure along Australia’s coasts are from storm damage and inundation.

Cyclones: Under climate change it is expected there will be fewer tropical cyclones, but more of these will be intense.

Floods and sea-level rise: The most dangerous events occur when inland flooding combines with a storm surge at the time of high tide. In the future, with higher sea levels, this combination will be even more dangerous.

Future sea-level rise: Reliable estimates of future sea-level rise are hard to obtain, principally because of uncertainty around past and future greenhouse gas emissions. The most recent estimate by the Intergovernmental Panel on Climate Change, is for an increase of 18 to 59 cm by 2060-2099 compared with 1990-2009. A more recent paper (Church et al., 2013) using a different model suggests a rise of 60 cm by 2100 compared with 1990.

Present-day sea-level: Observations show that sea-levels are rising. The global average increase since 1980 is around 215 mm. Over the period of satellite data (1993), around Australia the greatest increases are in the north, and the smallest are in the south (CSIRO and BoM, 2012; see Figure 1). Observed changes since 1990 are likely towards the upper limit of model projections, suggesting that estimates for the future may be too low (see Figure 2).

Sea surface temperatures: The principal risks to people and infrastructure along Australia’s coasts are from storm damage and inundation.

Sea surface temperatures around Australia have increased by about 0.8°C over the last 100 years (CSIRO and BoM, 2012; see Figure 3). Reliability estimates of future sea-level rise are hard to obtain, principally because of uncertainty around past and future greenhouse gas emissions. The most recent estimate by the Intergovernmental Panel on Climate Change, is for an increase of 18 to 59 cm by 2060-2099 compared with 1990-2009. A more recent paper (Church et al., 2013) using a different model suggests a rise of 60 cm by 2100 compared with 1990.

The biophysical and socioeconomic complexities of Australia’s coastal environment present challenges for decision makers seeking to effectively and efficiently manage the coastal zone under current conditions. How much greater will these challenges become under future climate conditions?

Goverance and management:

- A wealth of guidance and information exists for coastal zone in Australia, addressing legal, planning, management and policy-development issues. It has been developed for different purposes, scales and audiences, and so likely to be something for everyone.
- Much of the material has no legal standing and so cannot be taken into account in decision-making.

Coastal interactions and stresses:

- Australian coastal ecosystems are under pressure from non-climatic stresses that include: invasive species, coastal development, habitat loss or disturbance, changes to nutrient and sediment dynamics (e.g. from runoff and erosion), and urbanization, including engineering solutions (e.g. sea walls, groynes) and “soft” options (e.g. dune protection and rehabilitation, beach nourishment) along with planning and development context.
- The ecosystem services provided by the Great Barrier Reef, which underpin tourism, commercial fishing and cultural/recreational activities, contribute an estimated A$6.9 billion p.a. to the Australian economy. At times, conservation and management planning can be at odds with the desire and needs of tourism and recreation industries.

Current effects, impacts and issues

- Sea-level rise has led to inundation on a semi-permanent and then permanent basis, especially where climate change leads to more intense and/or more frequent storms. Many properties and infrastructure such as roads and ports are exposed. For a sea-level rise of 1 m the combined exposure of commercial, light industrial, transport and residential infrastructure is estimated as greater than A$20 billion (2009 prices)—COOL (2011).
- Inundation threatens the security of water and power supplies, as well as sewerage facilities, and can disrupt supply chains, with potential effects on resilience and adaptation.
- Sea-level rise can also lead to salinisation of soils and saline intrusion into estuaries and freshwater habitats, with potential effects on water resources and agriculture.
- Increasing dissolved CO₂ in ocean is leading to increased acidification of oceans with impacts for marine life, shaping ‘reef decline’ and providing additional challenges for other parts of the marine environment. Coral bleaching events appear to be more frequent and severe and coral reefs globally are estimated to be 10–17% bleached today (IPCC, 2014).
- Changes in wave climates may lead to significant changes in coastal environments, potentially adverse to development.
- Silver beckoning to the beauty of existing coastal systems, including intertidal areas and near-shore marine environments, that exist in these normal conditions at least 1°C higher than the back-shore summer mean. Coastal sea-level rise on the Great Barrier Reef declined by 50% from 1986 to 2012, with about 10% of the decline attributable to decreasing the remaining 10% was caused by tropical cyclones and/or predation by crown of thorns starfish.

30 years of coastal zone management in New South Wales

Different states have different models of coastal zone management. An effort is being made in planning for sea-level rise takes place, but all of these states/regions are complex. This shows a lot of effort, but it is showing how such complex situations evolve.

The coastal zone is a key economic asset at risk under climate change. Priority policy actions focus on high-level outcomes providing for strong and integrated governance and policy. The points below outline what is required to progress climate change adaptation planning at the right scale and to the particular location.

The right policies: leadership, consistency, integration

1. Develop a clear strategic direction of how coastal zones will be managed and ensure consistency across all levels of government. The needs are for:

- Clear state and federal strategic direction to provide consistency and authority to decisions made at the local level.
- Consistently-applicable guidelines and policy guidance across tiers of governments and between local government areas.
- Communities and government working together in the decision-making process.
- Policy or guidance to extend insurance to “soft” options and to allow greater insolvency.

2. Provide a legislative context and support for this strategic direction. The needs are for:

- Federal, state and local government agreement on national coastal zone management objectives, principles and roles, with clearly defined responsibilities.
- Clear legislation to provide consistency, authority and long-term stability in planning and management.
- Regional and local scale plans with legal standing.
- Processes to ensure compliance, and resourcing for councils to implement these processes.

3. Ensure a strong statutory link between land-use planning, hazard protection and natural hazard protection to deliver an integrated coastal management approach. The needs are for:

- An integrated coastal management program, integrating role management and conservation into the planning system.
- An integrated coastal management program, integrating role management and conservation into the planning system.
- A consistent approach to management and policy development that integrates hazard protection to deliver an integrated coastal management approach.
- A consistent approach to management and policy development that integrates hazard protection.

4. Develop new land ownership structures and options to address new challenges. The current legal context provides the flexibility to meet the challenges of future climate change. Under existing common law, real estate is owned and held by private individuals or companies. The needs are for:

- Explanation and evaluation of potential fill-for-purpose mechanisms.
- These mechanisms include changes in land tenure laws (e.g. reverse mortgages, leasehold etc.), moving exposed property to public ownership, and setting thresholds of climate change/sea-level rise impacts to trigger changes in policy or climate change adaptation strategies.

5. Develop guidelines of where planning should not allow development. Under climate change and sea-level rise, some developed lands will become low-lying and may be regularly exposed to flooding. The needs are for:

- New coastal management strategy and legislation which defines land-use categories in which development is strongly recommended to be excluded.

Adaptation actions and policy

The needs are for:

- Clear state and federal strategic direction to provide consistency and authority to decisions made at the local level.
- Consistently-applicable guidelines and policy guidance across tiers of governments and between local government areas.
- Communities and government working together in the decision-making process.
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Develop guidelines of where planning should not allow development. Under climate change and sea-level rise, some developed lands will become low-lying and may be regularly exposed to flooding. The needs are for:

- New coastal management strategy and legislation which defines land-use categories in which development is strongly recommended to be excluded.
The biophysical and socioeconomic complexities of Australia’s coastal environment present challenges for decision makers seeking to effectively manage the coastal zones under current conditions. How much greater will these challenges become under future climate change?

The right policies: leadership, consistency, integration

1. Develop a clear strategic direction of how coastal zones will be managed and ensure consistency across all levels of government. The needs are for:
   • Clear state and federal strategic direction to provide consistency and authority to decisions made at the local level.
   • Consistently-applicable guidelines and policy guidance across tiers of government and between local government areas.
   • Communities and governments working together in the decision-making process.
   • Policy guidelines on when it is appropriate to “renew” and when to “adapt.”

2. Provide a legislative context and support for this strategic direction. The needs are for:
   • Federal, state and local government agreement on national coastal zone management objectives, principles and tasks with clearly defined responsibilities.
   • Clear legislation to provide consistency, authority and long-term stability in planning and management.
   • Regional and local scale plans with legal standing.
   • Procedures to ensure compliance, and rethinking for councils to implement these processes.

3. Ensure a strong statutory link between land-use planning, conservation and hazard protection to deliver an integrated coastal management approach. The needs are for:
   • An integrated coastal management program, integrating role management and conservation into the planning process.
   • Future coastal hazard laws (e.g., incorporating erosion, inundation and seaweed/real) should be integrated with planning for the coastal environment to enhance accessibility and use safely.

4. Develop new land ownership structures and options to address new challenges. The current legal basis for protecting the future of coastal climate change. Under existing common law, most land in coastal areas is held in fee simple and is owned by the state. The needs are for:
   • Exploration and evaluation of potential for-cost-recovery mechanisms.
   • These mechanisms should incorporate land use and real property (e.g., reversionary rights, easements etc.,) more exposed property to public ownership, and setting thresholds of climate change/sea-level rise impacts to trigger changes in policy or climate-related adaptation strategies.

5. Develop guidelines of where planning should not allow development. Under climate change and sea-level rise, some zones will not be appropriate for, or will prove impracticable and unacceptable long-term use due to sea level rise or liability for governments. Governments can no longer afford to be the “users of last resort” for inappropriate planning. The needs are for:
   • New coastal management strategy and legislation which defines land-use categories in which development is strongly recommended to be excluded.

The coastal zone is a key economic asset at risk under climate change. Priority policy actions focus on high level outcomes providing for strong and integrated governance and policy. The points below outline what is required to progress climate change adaptation planning at the right scale for the coast to the particular location.
The coastal zone is a key economic asset at risk under climate change. Prior policy actions focus on high-level outcomes providing for strong and integrated governance and policy. The points below outline what is required to progress climate change adaptation planning at the right scale to address to the particular location.

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1. Develop a clear strategic direction of how coastal zones will be managed and ensure consistency across all levels of government.
   - Clear state and federal strategic direction to provide consistency and authority to decisions made at the local level.
   - Consistently applicable guidelines and policy guidance across tiers of governments and between local government areas.
   - Communities and governments working together in the decision-making process.
   - Policy or guidance on where it is appropriate to “release” and where to “protect.”

2. Provide a legislative context and support for this strategic direction.
   - The needs are for:
     - Federal, state and local government agreement on national coastal zone management objectives, principles and rules with clearly defined responsibilities.
     - Clear legislative to provide consistency, authority and long-term stability in planning and management.
     - Regional and local scale plans with legal standing.
     - Processes to ensure compliance, and reordering for councils to implement these processes.

3. Ensure a strong statutory link between land-use planning, conservation and hazard protection to deliver an integrated coastal management approach.
   - The needs for:
     - An integrated coastal management program, integrating role management and conservation into the planning process.
     - Future coastal hazard plans (i.e., incorporating erosion, inundation and coastal flooding) should be integrated with planning for the ecosystem protection, accessibility and use value.

4. Develop new land ownership structures and options to address new challenges.
   - The current legal context fails to meet the challenge of future climate change. Under existing common law, most land in coastal areas is freehold and rights are with the owner. The needs for:
     - Exploration and evaluation of potential fit-for-purpose mechanisms.
     - Mechanisms that incorporate increased land tenure obligations such as reverse mortgages, leasehold estate, morion exposure to property owners, and setting thresholds of climate-change-related loss impacts to trigger changes in policy or climate adaptation strategies.

5. Develop guidelines of where planning should not allow development.
   - Under climate change and sea-level rise, some development will no longer be appropriate, or will present major and unacceptable long-term risks and/ or liability for governments. Governments can no longer afford to be the “insurers of last resort” for inappropriate development. The needs for:
     - New coastal management strategy and legislation which defines land-use categories in which development is strongly recommended to be excluded.
At the right time and the right level: Subsidiarity, flexibility, timeliness

1. Provide local governments with the authority to act. There is currently a lack of clarity as to who is the `coastal authority’ for addressing coastal issues. The need is for:
   - Enhanced powers for local decision-makers.
2. Embed climate change adaptation into day-to-day local government operations. The need is for:
   - A start now to the process of developing and implementing adaptation strategies;
   - Regular monitoring and review of coastal adaptation policy, given the dynamic nature of coastal systems and the changing knowledge base of climate change science;
   - Building a planning system that is flexible enough to deal with multiple demands and hazards. The need is for:
     - coastal management which can deal with multiple demands and hazards;
     - Coastal planning systems that can entertain and plan for competing pressures and demands, and can yield knee-jerk reactions to disaster and can seek to achieve a balance between people and the natural environment.

With the right tools: Communication, capacity building, knowledge

10. Ensure information on future climate and sea-level rise is tailored to coastal management. Greater precision in climate change projections does not necessarily imply greater accuracy, or necessarily improve coastal planning outcomes. The need is for:
   - Sensitivity analyses to understand where the risks and vulnerabilities lie, and what can be done to reduce the exposure to risk.
11. Develop new strategies or language for dealing with arbitrary lines and benchmarks. A difficulty is that these are:
   - Based on predictions with inherent uncertainties and therefore subject to changing knowledge of climate change science.
12. Develop adaptation plans and approaches is a lengthy process. The need is for:
   - A regulatory requirement on all local councils to consider climate change in the decision-making process.
   - A risk associated with policy open to interpretation is that it will fail to meet its intended purpose. Providing careful context will improve application and help ensure fitness for purpose.

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Building resilient coastal communities and ecosystems

Coastal managers face the challenges, on the one hand, of future climate change and sea-level rise and, on the other, of increased development demands, infrastructure planning, renewal and maintenance, and environmental protection. Effective management of the coastal zone by local governments under climate change and sea-level rise requires:

- consistent guidance from state and federal government on how coastal zones should be managed, with legislative support that links land-use planning, conservation and hazard protection. This includes clear guidance on the circumstances under which development should not be approved;
- systems that provide local governments with the authority to ensure compliance; and
- time and investment in knowledge, capacity and resources to transition local governments successfully to this new paradigm.

Such frameworks allow local governments to embed adaptation to climate change into their day-to-day operation and effectively manage the coastal zone under climate change.

Key Points

- Coastal managers face the challenges, on the one hand, of future climate change and sea-level rise and, on the other, of increased development demands, infrastructure planning, renewal and maintenance, and environmental protection. Effective management of the coastal zone by local governments under climate change and sea-level rise requires:
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 Such frameworks allow local governments to embed adaptation to climate change into their day-to-day operation and effectively manage the coastal zone under climate change.
At the right time and the right level: Subsidiarity, flexibility, timeliness

6. Provide local governments with the authority to act. There is currently a lack of clarity as to who is the ‘coastal authority’ for enforcing compliance. The need for:
   • Enforcement powers for local decision-makers.

7. Embed climate change adaptation into day-to-day local government operations. The need for:
   • Maintaining of adaptation (e.g. design standards for new and upgraded roads, culverts, bridges etc. to include climate change parameters) which would avoid costs to be spread incrementally over decades.

8. Build in sufficient time to allow for effective adaptation planning, starting now, and regularly review progress. Developing adaptation plans and approaches is a lengthy process. The need for:
   • A start now to the process of developing and implementing adaptation strategies;
   • Regular monitoring and review of coastal adaptation policy, given the dynamic nature of coastal systems and the changing knowledge base of climate change science.

9. Build a planning system that is flexible enough to deal with multiple demands and hazards. The need for:
   • Coastal management which can deal with multiple demands and hazards;
   • Coastal planning systems that can accommodate for complex pressures and demands, and which know how to adapt and can seek to achieve a balance between people and the natural environment.

With the right tools: Communication, capacity building, knowledge

10. Ensure information on future climates and sea-level rise is tailored to coastal management. Greater precision in climate change projections does not necessarily imply greater accuracy, or necessarily improve coastal planning outcomes. The need for:
    • Sensitivity analyses to understand where the folks and vulnerabilities lie, and what can be done to reduce the exposure to risk.

11. Education and training to understand better how to use climate change projections. The need for:
    • Better education of local government planners, and their constituents (e.g. local residents) on the potential implications of climate change on their area.

12. Develop new strategies or language for dealing with arbitrary lines and benchmarks. A difficulty is that these are (a) based on predictions with inherent uncertainties and therefore subject to future variations and (b) static markers for a very dynamic system. The need is for:
    • Markers, boundaries and development lines which are carefully contextualised. Rather than benchmarks, they should be established as testing points and supported by a greater understanding of their interpretation and use.

13. Enforcement powers for local decision-makers. The need for:
    • Knowledge communication tools that will build community capacity to interpret existing and emerging science. Growing this capacity will require programs and contextual support will improve application and help overcome fears for purpose.

14. Ensure that all those involved in the decision-making process for coastal zones (the community, planners, council decision-makers) have the information and capacity needed to achieve successful coastal planning outcomes. The need for:
    • Public consultation to understand where the folks and vulnerabilities lie, and what can be done to reduce the exposure to risk.

15. Educational and training to understand better how to use climate change projections. The need for:
    • Better education of local government planners, and their constituents (e.g. local residents) on the potential implications of climate change on their area.

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