# Climate Change Adaptation Principles

## Bringing adaptation to life in the marine biodiversity and resources setting

Australian Government
Great Barrier Reef Marine Park Authority

NCCARF
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# Background

With changes in climate widely acknowledged by leading international and national research bodies, the impacts on marine biodiversity and resources are likely to be significant. Recent reports and peer-reviewed literature have clearly demonstrated that the impacts on the marine environment have already started to occur (see ARN-MBR 2009 for a list of peer reviewed resources). Over the next century impacts are likely to include, among others:

- Mangrove areas expanding further landward, driven by sea-level rise and soil subsidence due to reduced rainfall
- Seagrass abundance and extent declining due to sea-level rise, increased storminess and warmer temperatures
- Increasing frequency and severity of mass coral bleaching events as temperatures warm, leading to declines in coral reef health
- Reduced coral growth rates due to ocean acidification, making reefs more susceptible to erosion and disturbance from storms
- Loss of diversity and widespread changes in the composition of coral reef fish communities following degradation of coral reefs.

*NCCARF (2009), Marine Climate Change in Australia, 2009 Report Card.*

Preparing for change requires individuals, institutions, and sectors to work together. Climate Change adaptation action on the ground and across all levels of decision making within the marine biodiversity and resources sector should be guided by the most recent adaptation science, research and practice. A series of high level guiding principles have been drafted (this document). They reflect the knowledge and expertise of researchers, resource managers, policy makers and resource users with direct experience in developing or applying adaptation knowledge.

The principles were developed following a one day workshop *Bringing Adaptation to Life*, held in April 2011 in Cairns, Australia. Organised by the Australian Government's Great Barrier Reef Marine Park Authority (GBRMPA), the National Climate Change Adaptation Research Facility (NCCARF), and the NCCARF's Marine Adaptation Network, the workshop brought together leading thinkers and practitioners to share experiences and lessons learned from working in the sector. The day comprised a range of presentations from participants, as well as small group working sessions.

In thinking about the components that make adaptation successful, the workshop session focused participants on brainstorming appropriate marine adaptation principles. The outcomes from this workshop session were reviewed and arranged into key theme areas, which then informed the drafting of the principles outlined here.

These principles are intended for use by adaptation practitioners to help inform adaptation decision making. Practitioners in the context of this document mean those who are actively working in and applying the concepts of adaptation. The application and level of adaptation knowledge varies across different geographic scales, and different decision making contexts. Hence these principles intend to

guide thinking about adaptation. To help readers understand how these principles can be applied, a series of storylines have been developed, through dialogue with key industry representatives, which present hypothetical examples.

One of the key messages from the working session was that if the principles are too specific and narrow then they are only likely to be useful in some situations and the potential for mal adaptation increased. Therefore, the outcomes from applying each principle will be different, depending on the context.

Each principle presents a different lens through which practitioners can view their day-to-day operations with respect to climate change adaptation. Practitioners are encouraged to think about what tools they have available at the moment (e.g. communication networks or policies), and who can support them in the process. Maintaining ongoing communication with scientists and researchers, through channels such as the NCCARF marine adaptation network, will help in transferring existing and emerging adaptation knowledge into adaptive action.

# Organisational Profiles

Two organisations have been central to the development of the principles provided in this document, the Great Barrier Reef Marine Park Authority (GBRMPA) and the National Climate Change Adaptation Research Facility (NCCARF). These organisations have coordinated to develop and communicate climate change adaptation knowledge specific to the marine biodiversity and resources sector. Together they organised the *Bringing Adaptation to Life* workshop and development of the set of guiding principles. These endeavours have provided an excellent opportunity to bring together industry, management, and research leaders to share their knowledge and experiences of climate change adaptation in the marine sector in Australia and internationally. The principles are designed to help stakeholders and policymakers identify strategies to convert adaptation knowledge into outcomes.

## Great Barrier Reef Marine Park Authority (GBRMPA)

As the Australian Government's representative agency for the protection and sustainability of the Great Barrier Reef, the GBRMPA is working with its partners to pioneer, implement and monitor climate change adaptation measures in marine management.

The Great Barrier Reef is already seeing the impacts of climate change. As part of its Great Barrier Reef Climate Change Action Plan, the GBRMPA, in conjunction with Reef industries and communities, is developing techniques to ensure the sustainability of marine practices under a changing climate. The industries and communities involved in these projects include tourism, fishing, natural resource management groups, conservation groups, schools and Traditional Owners. These partners have a vested interest in ensuring the Great Barrier Reef remains one of the healthiest ecosystems in the world, and are supporting the GBRMPA in its goal to strengthen the resilience of the Reef to the impacts of climate change. Visit www.gbrmpa.gov.au for more information.

## National Climate Change Adaptation Research Facility (NCCARF)

The National Climate Change Adaptation Research Facility (NCCARF) aims to generate the biophysical, social and economic information needed by decision makers in government and in vulnerable communities, to manage the risks of climate change impacts by leading the research community in a national interdisciplinary effort.

One of NCCARF's primary goals is to bring researchers and practitioners together in a cooperative space to ensure information exchange occurs and experience is utilised across the board. NCCARF's has nine priority themes, one of which is Marine Biodiversity and Resources. Climate change poses a significant challenge for Australia's marine sector. Increasing sea surface temperatures, sea level rise and ocean acidification are just a few threats from climate change on our coastal and oceanic ecosystems.  Visit www.nccarf.edu.au for more information.

# Adaptation Principles emerging from the marine setting

## Arising from the workshop

The following principles guide action and decision making around adaptation. They are meaningful statements that apply to all practitioners in the marine biodiversity and resources sector. The principles are generic in nature, reflecting the outcomes of the *Bringing Adaptation to Life* workshop.

1. **Clarity within context**

   Clearly define the context of the issue (stakeholders, industries, adaptation type, scale, any project/program context etc), along with expectations and constraints. Use this as the basis for planning further action.

2. **Positive change**

   Focus on influencing and building capacity in what is most needed. This will be different in different contexts, so ensure the approach is tailored.

3. **Compelling future vision**

   Create an imaginative and compelling vision to guide planning into the future, for example, using a ‘preferred futures’ approach.

4. **Flexible and adaptive**

   Recognise that uncertainties are certain. Consider innovative approaches to ensure change can be quick and efficient. Be prepared to try something different, and throw out the rule book! Remember that adaptation is a process, and is never finished.

5. **Engage, include and excite**

   Design and apply participatory and inclusive processes for stakeholder engagement, clearly outlining benefits to those involved. Allow the space and time for relationships and trust to develop and consider different ways to engage.

6. **Diverse incentives**

   Focus on rewarding buy-in and the achievement of incremental goals.

7. **Built on existing foundations**

   Freely share knowledge and lessons learned, building on current and past experiences.

8. **Action orientated and specific**

   Create and deliver a detailed action plan that considers strengths, limitations, opportunities and threats. Start somewhere, without trying to get it perfect straight away.

9. **Open and communicative**

   Ensure a systematic, practical and shared understanding of key terminology, goals, approaches and outcomes (e.g. demonstration projects).

10. **Achievable and simple**

    Focus on both the future vision and what is achievable at present. Keep things simple - easy to understand and implement - with small, incremental goals.

11. **Fair and equitable**

    Consider how adaptation action impacts gender, generations and cultures. Being effective means being equitable and above all, ‘doing no harm’.

## Additional principles arising from the literature

Reflecting on key literature revealed additional principles for effective adaptation planning in addition to those arising from the workshop. These key principles are distilled below. Further elaboration is provided in the next section.

12. **Measurable and reflective**

    Any adaptation action must have resources allocated for reflecting on outcomes and a framework in place to measure progress and impact against appropriately designed criteria. The 'regular monitoring and evaluation of adaptation action' principle ensures this occurs.

13. **Prioritisation**

    Prioritisation means assigning levels of priority for adaptation action, based on pre-defined criteria, such as cost effectiveness, or alignment to specific development outcomes.

14. **Role of leadership and individuals as catalysts**

    This principle aligns to *Number 8: Action orientated and specific*, and underlines the importance of having strong leadership in achieving adaptation outcomes. Often one individual who acts as a champion for the cause can make a significant difference and act as a catalyst for adaptive change.

**15. Couched within existing policies, structures and processes**

Aligning to *Number 7: Built on existing foundations* and *Number 10: Achievable and simple*, this principle refers to optimising and leveraging existing policy and infrastructure. In some contexts, policies and processes may already be in place that allow for the easy implementation of adaptation action. In other contexts, however, change will require lessons to be learned or current policies to be adapted to facilitate effective adaptation.

**16. Cost effective**

Weighing up the costs and benefits of adaptation action is the final proposed principle. Decision makers need to ensure resources are allocated efficiently and that mal-adaptation and the associated costs are avoided.

# Background to Additional Principles

Although there are no easily identifiable examples of specific marine adaptation principles in the literature there are general climate change adaptation principles that others are applying. We reviewed these generic principles and extracted common threads that could be relevant in the marine setting and that had not already been identifies at the *Bringing Adaptation to Life* workshop.

One of the key common principles in the literature is focuses on community engagement and participation. Adaptation action requires commitment and cooperation across numerous levels. Engaging with the community is widely viewed as a pre-requisite for driving action that is authentic and addresses the most vulnerable people, places and resources (Hale et al. 2009; *National Resource Management Ministerial Council 2010*). For example, multi-stakeholder participatory approaches recognise the complexity of adaptation and help to create a common ground for implementation. Selecting the right stakeholders and developing a vision to guide their engagement is also seen as an important step (Prutsch et al. 2010). The distinction between full empowerment versus consultation was noted in the workshop, emphasising that engagement and participation must be contextually relevant (see also *Adaptation Research Network* - Oct 2009).

Another principle that is reflected in the literature is around coordinated approaches to adaptation action. Coordination in this sense means politically and regionally, as well as within and across sectors. For example, the *Interaction Policy Paper* (2009) notes the importance of country led and community based implementation of adaptation programs, emphasising the coordination should result from a place of ongoing government commitment to help support vulnerable people and places, and not from obligation. Prutsch et al (2010) adds that a regionally coordinated approach is needed as marine resources stretch across geographical and governance boundaries. Similarly, perspectives on community adaptation in Canada place a focus on effective communication between and within governments to ensure coordinated approaches to adaptation planning (Bizikova et al. 2008). Other international perspectives underline that coordination between policy and investment issues in adaptation planning and decision making is required (UNDP 2010).

Achieving effective adaptation outcomes despite unexpected changes (or uncertainties) sometimes means having to change existing approaches and action plans. The ability to be flexible and adaptive is a key principle in the literature (Adaptation Research Network 2009; Hale et al. 2009; Prutsch et al. 2010). Depending on the context, various conditions have to be in place to allow for flexibility and more importantly, responsiveness to change. Some conditions include having access to and understanding the latest science and climate predictions, and implementing regular monitoring and evaluation of adaptation actions (Prutsch et al. 2010).

Making the most of existing policy or management practices and working with what is already in place was another principle noted in the literature. When planning for adaptation, considering how best to utilise and leverage existing mechanisms and infrastructure can be an effective way to facilitate

integrated management. This also relates to ‘nature’s infrastructure’ in the case of emerging ecosystem-based adaptation approaches (Hale et al. 2010). Maintaining and utilising natural structures to help protect against climate change in many situations makes sense, both economically and scientifically. For example, planting or restoring mangrove habitats helps to protect against shoreline erosion due to severe storm events and has benefits for local communities and biodiversity.

Finally, guiding decision making around adaptation is the principle of planning for the long-term. While specific impacts may be difficult to predict, particularly where information may be incomplete, being forward thinking, and having long-term planning processes in place allows for greater preparedness for change (UNDP 2010). Being proactive and taking ownership for potential future change will also maximise short term investment decisions.

# Applying the Principles in the marine setting

Adaptation involves planning; practitioners need to think about the principles when planning to undertake adaptation. These four marine storylines provide some illustrations and examples of this. The storylines have been developed in conjunction with industry representatives to ensure that despite being hypothetical, the situations and people are believable.

## Phil the commercial fisher

**Guiding Principles**

4 Flexible and adaptive
7 Built on existing foundations
8 Action orientated and specific
10 Achievable and simple

Phil has been a commercial fisher for over 30 years. He remembers hearing stories from his father about changes in the distribution and abundance of certain fish stocks, and the correlation this had with changes in water temperature and currents. He doesn't understand exactly how or if the climate will change in the long-term, but he understands that with any changes in water currents, he would have to become much more mobile to ensure a profitable catch. This would mean some changes to his current fleet and fishing gear, which would affect his bottom line quite significantly. He has already been finding it difficult to maintain his income, as more areas have been restricted for commercial fishers.

In reading the principles, Phil starts to think about what he can do to make sure future changes do not directly impact his bottom line. He knows he wants to remain in the industry for a while yet, so he writes up a detailed plan on what he will do to ensure sustainability into the future. Phil wants to approach other retired veteran fishers in the area; those who have seen decades of change and find out how they managed to maintain a profitable catch during times of change. He also decides to join a fishers co-op to make sure that if there are changes in the future, then he has support in numbers. He has been thinking about this for a while now, and knows that it will also help to reduce some of his immediate costs as he will have access to member facilities and infrastructure. He realises that if the climate is going to change significantly, then co-op members will need to be flexible and try new things to ensure profitability, for example inviting aquaculture farmers to be co-op members to maintain throughput.

## Paul the policy maker

### Guiding Principles

1 Clarity within context
5 Engage, include and excite
9 Open and communicative
11 Fair and equitable

Paul is starting to plan for the long-term allocation of reef sites to be used for new tourism ventures. He wants to work with industry groups and the community to ensure that the tourism industry continues to be sustainable in the long-term, given predicted changes in climate.

In reading the principles, Paul has found them helpful in thinking about how to integrate climate change issues into the policy he's working on. First he completes a detailed stakeholder analysis, identifying key industries in the area, and looks into the literature to find out about any coastal vulnerability assessments that have been undertaken in the region. He also spends considerable time talking to experts in the field. Finally, he reviews existing policies in place in light of current projects in the area that focus on maintaining coastal infrastructure. He wants to have a strong understanding of what the climate change impacts could be and who, what, and where would be impacted most.

After this review, Paul decides that the first thing he needs to focus on is his stakeholders, given that there is a lot of existing impact research available and some new research about to be published. He employs a specialist to design and implement an in-depth industry and community consultation process. During the consultation, Paul takes the time to talk to the people in the area himself. He talks with the community about economic opportunities for their region and what changes it would mean to the use of certain reef areas, both as a result of climate changes, and new tourism ventures. Following consultations, Paul ensures outcomes reach stakeholders, through arranging and attending a series of open information forums, using online and social media, and reaching out to local schools to develop a small arts exhibition at the local community hall.

## Angela the aquaculturist

### Guiding Principles

1 Clarity within context
2 Positive Change
7 Built on existing foundations
10 Achievable and simple

Angela runs a medium size aquaculture farm, working long days with her partner and five staff to manage the operation. The farm has been her family's business for three generations now. She remembers when she was a child that they used to have several hatcheries close to the estuary that are no longer there.

Even though Angela's farm has a business plan in place for the next 20 years, she is getting nervous about changes she's seen in how often, and how severely, flooding is occurring in certain parts of her farm and what this is costing her. Since her lease is up for renewal at the end of her current business plan term, she is weighing up her options for the future. Angela keeps well informed about local news and takes a keen interest in her local area and its future, so she understands that she'll also need to consider long-term climate change in her planning.

In reading the principles, Angela has started to think about who she can talk with to get some advice about long-term planning for her business, in particular, planning for changes in the number and severity of storms, and long-term sea level rise. Working through emerging issues and including them in her business plan is nothing new for Angela, as she's done this all her life. For example, a few years ago, a new disease was discovered just up the coast that could have wiped her business out if she hadn't taken steps in advance to manage the threat.

She decides to invest in some training for herself and one of her senior staff to learn how to assess the vulnerability of her operations to predicted future climate changes. She also works with her partner to look for some new land on higher ground that might be good for future farming if climate changes do occur. She asks him to find out about the costs and paperwork involved for new lease areas. They agree to review their existing business plan to ensure it takes into account some of the potential vulnerability their operation could face in the future. They are also making sure they have an action plan in place for simple things they can start to do straight away to reduce their business risk, and to take advantage of potential business opportunities.

## Clare the conservationist

**Guiding Principles**

3 Compelling future vision
6 Diverse incentive
9 Open and communicative

Clare dives in an ocean that is cold enough to freeze her face during a dive. She enjoys the species that she sees further north, but she doesn't want them suddenly appearing in her area, before something is done to protect the local biodiversity. She knows that some change in the type of species she will see in the future is inevitable because of climate change, but she wants to make sure that her children will get to experience and see what she does.

Clare knows that predicted climate changes would mean changes in, among others, ocean temperature, ocean currents and water pH levels, and has already noticed some change on her regular dives. She recently heard about some new research that was released about the climate change impacts on marine biodiversity, so she wants to let others that use the ocean in her area know and work with them to take positive action.

Her main concern is that the current marine protected areas might be inadequate when considering future climate change, and worse still, they may also be in the wrong place. She believes new reserves should be created now to ensure they take into account anticipated future change, and/or the boundaries of existing reserves moved in the direction of predicted future change in habitats.

Clare remembers the considerable effort it took to establish those protected areas in the first place, and knows that any future changes will take time. Creating new protected areas will affect people in different ways, so Clare knows everyone needs to think creatively and be open to work with stakeholders and scientists to maximise buy-in.

Clare has decided to talk to some key players in the area to organise an open information session to plan out the best way to address the issues systematically and practically. She has found the principles useful because they encourage stakeholders to start thinking and talking about the issues facing marine areas around where she lives.

# Next Steps

The Great Barrier Reef Marine Park Authority (GBRMPA), together with the National Climate Change Adaptation Research Facility (NCCARF) and the participants of the *Bringing Adaptation to Life* workshop hope that readers have found this document to be a useful resource. We encourage users to experiment with, and add to, the collective knowledge of climate change adaptation within the marine biodiversity and resources sector.

The adaptation principles outlined could be further developed through liaison with practitioners in the marine setting. One way for gaining feedback as to the effectiveness of the principles would be to collect narrative data about how industry practitioners, managers and researchers have applied them in their respective professional fields.

A key role for adaptation networks could be to provide a mechanism for the regular capture of learning around the application of the principles and to help support the transfer of this learning to improved future action. This could be achieved through existing mechanisms such as marine research networks, or by creating a network or online space for industry practitioners to contribute their learning. Since knowledge around adaptation is changing and developing so quickly, organising events similar to the *Bringing Adaptation to Life* workshop would also play a key role in helping to translate current research into industry practice.

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