CoastAdapt

Snapshot

Prioritising climate change adaptation options for iconic marine species

Summary

Climate change impacts are widely documented across species and regions throughout Australia and for these populations to persist, intervention may be required. Marine mega-fauna — which include seabirds, marine mammals, turtles, sharks and rays — play pivotal ecological roles in healthy marine ecosystems and are also of high social and economic value. Many of these species are currently listed as endangered, vulnerable or near threatened. This snapshot illustrates a set of linked methods that can be used to develop and prioritise adaptation options for a wide range of marine species based on the vulnerability framework.

Keywords

Climate change, adaptation pathways, marine, mega-fauna, cost-benefit, risk, prioritisation

Many of Australia's iconic species are facing increased danger due to climate change. Issues range from loss of habitat to changing weather patterns and threats to stable food and water sources. There is growing interest from conservation managers regarding options for assisting threatened species to cope with these impacts. The strategic four-stage process described below can provide useful intervention options to conservation managers and those interested in protecting and maintaining Australia's biodiversity.

SAPS Assessment Plan

The four-stage assessment plan, termed Sequential Adaptation Prioritisation for Species or SAPS, (Hobday et al. 2015), aims to reduce the risk of population loss due to climate change (see Table 1). The four stages of the framework are:

1. Generate adaptation options
2. Technical assessment of options
3. Barriers analysis
4. Social acceptability.

Table 1: Four stages of the prioritisation of adaptation options in the SAPS. Source: © Alistair Hobday.

Stage	Responsible group	Assessment tool
1. Generate options	System or species experts	Vulnerability framework
2. Technical assessment	System or species experts	Cost-benefit-risk
3. Institutional assessment	Policy and management	Barriers analysis
4. Social assessment	Public	Social acceptability

SAPS evaluates, selects and tests adaptation options that can be used to prevent population loss and enhance the wellbeing of iconic species. Adaptation options are generated based on the widely used IPCC vulnerability model (which looks at exposure and sensitivity to risk, as well as a species' adaptive capacity - see Figure 1) and are then assessed using three screening tools designed to evaluate cost-benefit risk, institutional barriers, and social acceptability.

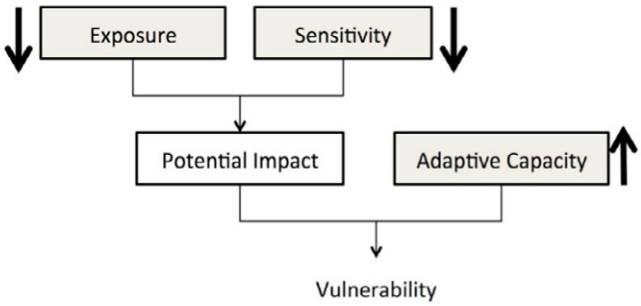

Figure 1: The IPCC vulnerability framework (IPCC 2007) is used to guide experts in generating adaptation options for iconic marine species that reduce their exposure, reduce their sensitivity, and increase their adaptive capacity.

Under the IPCC framework, vulnerability to the effects of climate change can be reduced by adaptation options that:

1. reduce exposure of the individuals/ populations/species
2. reduce the sensitivity of the organisms
3. increase the adaptive capacity of the individual/species to cope with the effects.

Results from each tool, and for each climate scenario, can be combined to give a score for each adaptation strategy (see Figure 2). The scores can be used to identify which options should be prioritised and which should be discarded (high benefit and low cost versus high cost and low benefit options).

These methods have been used to evaluate, select and trial adaptation options to help offset declines and enhance the population status of species such as Australia's shy albatross (Alderman and Hobday 2016). In this case, top-ranked adaptation options include rescuing birds from collapsed caves in colony areas by constructing escape ramps, and providing artificial nests to offset climate-related declines in breeding success (Figures 3 and 4). Low ranked options include egg and chick rescue during extreme events followed by egg and chick replacement after the event has passed. Disease treatment was selected and trialled, and resulted in improved breeding success. Managers are now using these tools to implement other adaptation options for a number of species.

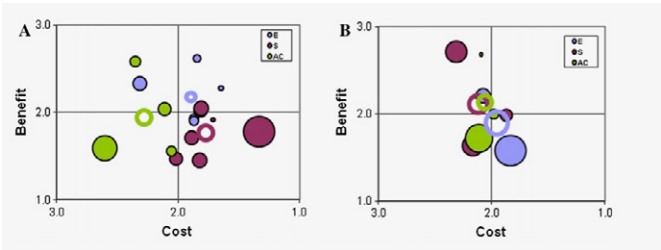

Figure 2: Average adaptation scores for Stage 2 technical assessment for A. Seabirds and B. Marine mammals using the cost-benefit-risk assessment tool. Open circles represent the mean value for exposure (E), sensitivity (S) and adaptive capacity (AC) options. The size of the bubbles represents the risk score (small represents low risk, large is higher risk). More information on combinations of adaptation options for seabirds and marine mammals can be found in Hobday et al. 2015.

Key findings and learning outcomes

- The cost-benefit risk tool identifies which options are best for implementation. Low cost and low benefit options might not be pursued; while those that are high cost, but high benefit may warrant further attention.
- The institutional barrier tool identifies where barriers may exist and potential strategies for overcoming them.
- The social acceptability tool helps identify options that are favoured or contested by society and provides guidance as to where education or outreach may be needed before implementing adaptation options.
- The tools illustrated can help managers implement strategies that can lead to more comprehensive responses to the threats that climate change will pose to Australia's iconic species.
- The methodology can also be applied to other conservation sectors.

References

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Figures 3 and 4: Shy albatross nest on Albatross Island, Tasmania. Photos: © Alistair Hobday, 2015.

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