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Perspective: Navigating long time horizons and uncertainty in planning

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[Editor's note: Jennie Hoffman is founder and principal of Adaptation Research and Consulting. She is an expert in climate change vulnerability assessment and adaptation of natural resource management and conservation to climate change. Hoffman has co-authored *Climate Savvy: Adapting Conservation and Resource Management to a Changing World*; *Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment*; and *Designing Climate-Smart Conservation: Guidance and Case Studies*.]

I have heard it argued that many planning horizons are too short to effectively incorporate climate change. How can a five-year recovery plan, for example, deal with changes that aren't expected to manifest for 30 or 50 years - particularly when there is uncertainty about exactly when and how those changes will play out?

One approach is to consider opportunity cost over multiple time horizons: that is, to consider the immediate and future benefits we may be giving up by choosing one option over another now. Even if the decision is just what we will do in the next five years, we can ask what options will remain open or be taken off the table over the long term as a result of our five-year plan.

This brings me back to a discussion that has played out in the past few issues of MEAM about the reality of tradeoffs and conflict in managing for conservation and food security (sparked by a piece by Jake Rice in the August/September 2013 issue). Particularly in light of climate change, it behooves us to think not just about what a tradeoff looks like now, but what it might look like in 10 or 30 or 50 years.

Let's say a community agrees to give up fishing in one area in exchange for guaranteed fishing rights in another. What if, in response to climate change, the distribution of the species of interest shifts completely out of the guaranteed access area into the "no-go" area? Or what if the no-go area was meant to protect a species or community that shifts out of the protected area into the fishing area?

If no permanent changes to the habitat have been made, the agreement can be renegotiated - for instance, changing protected area boundaries or shipping lane locations. If permanent or semi-permanent changes are being considered - for example, the use of destructive harvest techniques like bottom trawling or the installation of tidal or wind power facilities - renegotiation at a later date is not as feasible.

Regardless of whether our primary concern is conservation, resource extraction or something else, we would all do well to consider whether and how what we care about may change in importance or location in response to climate change (or anything else for that matter). This can be based on quantitative modeling or on qualitative what-if scenario thinking depending on data availability. How might tradeoffs change if the species of interest shifts north or south, to deeper or shallower water? How much could the value of the resource of interest change before stakeholders would change what they are willing to agree to?

"Best available science" should include best practices in decision making under uncertainty

I know some people are uncomfortable bringing qualitative considerations into tricky planning or management decisions. Still, if the best available science tells us that change is likely but that we do not know exactly when and how those changes will manifest, doesn't using the best available science mean using best practices for decision making under uncertainty? We can make negotiations and decisions more transparent and sustainable by explicitly exploring the implications of potential changes over time on what stakeholders are willing to give up.

A few examples of how this sort of thinking has been applied in practice:

- In the United Kingdom, coastal planning guidelines require the evaluation of both goals and consequences over multiple time horizons, called epochs (www.gov.uk/government/publications/shoreline-management-plans-guidance).
- Researchers found that incorporating future risk of catastrophic bleaching into reserve design for coral reefs could increase reserve network performance by more than 60% while increasing costs by just 2% (www.esajournals.org/doi/abs/10.1890/07-1027.1).
- In the Chukchi and Beaufort Seas, the North Pacific Fishery Management Council was concerned that a northward shift of commercially important species could lead the industrial fishing fleet into areas important for culture and subsistence of coastal communities. In a precautionary move, the Council blocked the northward expansion of bottom trawling until the implications of climate change for the linked marine and human systems in the region are better understood (www.npfmc.org/arctic-fishery-management).

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