

## Tundi's Take: Using Science to Plan for Climate Change

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Climate change may change everything, even in the vast and resilient global ocean. How can managers be proactive about climate-induced changes? What kinds of information do they need? How can they work around (or with) the substantial uncertainties that surround how ecosystems will respond, and at what rates?

I have been thinking about the role of science in adapting EBM to a rapidly changing world. My thinking has been spurred by work with the North American Marine Protected Area Network initiative (NAMPAN), which is considering how climate change could impact areas identified by the initiative as high priorities for conservation. (NAMPAN is supported by the Commission on Environmental Cooperation and the three countries that make up the CEC - Canada, the US, and Mexico.)

In my view, science can be used in a spectrum of ways to help planners and managers cope with an ever-shifting mosaic of ecosystems, habitats, and species. The ways range from a basic approach to more complex ones:

- The simplest approach involves gathering expert opinion on how climate change might affect each particular species or habitat type. These opinions are then passed on to planners and managers who are focused on those specific organisms or habitats.
- A more systematic approach is to "georeference" the climate change information - applying the gathered expert opinion to specific places. Habitat mapping is needed to do this, at various nested scales: across ecoregions, across habitats, and across particular sites of conservation importance. This allows triage. In other words, effort to predict changes driven by climate would focus primarily on areas deemed to be ecologically significant.
- The most sophisticated approach uses climate models to predict very specific changes in geography (how habitats and species might move due to climate change), productivity, and ecosystem health. The scenarios produced by such an exercise could guide management in a number of ways. These could include focusing effort on maintaining the resilience of the most ecologically critical parts of the marine system, preventing barriers to the movement of species and communities, and easing harvest pressure on resources predicted to be crucial in maintaining marine food webs in the future.

What is clear is that EBM will have to ramp up its adaptability and its responsiveness to the coming changes to be effective in a climate-changed future.

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