

Monmouth
Dean's Seminar Series
New Jersey, 2016

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Title: Responses of wild plants and animals to Anthropogenic Climate Change: Challenges and solutions in a time of rapid global change

Abstract:

Climate change is but the latest in a series of ever-increasing anthropogenic pressures on natural systems, yet there are fundamental differences between this relatively new threat and traditional anthropogenic stressors that have challenged ecological research over the past century. With greenhouse gas emissions continuing to rise, earth is rapidly approaching a climate regime that has not been experienced for hundreds of thousands of years. There have been several global as well as regional meta-analyses of observed impacts of anthropogenic climate change on the distributions of species around the world. I will give an overview of these results, focusing on the "big picture" trends that have emerged from changes across terrestrial, marine and freshwater systems. These analyses have documented that about half of plants and animals have shifted their ranges towards the poles and up mountainsides, and about 2/3 have advanced their spring phenologies, attempting to track the shifting climate in both space and time. To date most of these changes have had relatively little negative impact on those species. However, we are starting to see negative impacts for the most vulnerable species - *i.e.* those occurring solely in sensitive systems or those that have already been highly impacted by other anthropogenic stressors.

The science of observed changes in the natural world to relatively small levels of warming of the past century (0.6° to 0.8°C), helped to shape the international declaration to keep anthropogenic warming below a 2°C limit (by 2100) in order to prevent "dangerous" climate change (Copenhagen Accord, 2009). However, even if emissions reductions are successful, preservation of biodiversity in the face of anthropogenic climate change will require novel forms of management and unconventional measures of 'success'. Some conservation options bring up ethical issues that question the philosophical foundation of traditional conservation. Successful conservation will increasingly depend on trans-national cooperation, both in terms of research and policy applications. Creative conservation solutions are not without risk, but successful conservation in a time of rapid environmental change will be that which recognizes that doing nothing carries risk as well.