

Alison Bates

Marine Policy Seminar Abstract

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Topic: Ocean Acidification: The Other Carbon Dioxide Problem

Ocean Acidification has become a growing topic of interest and research in the scientific community over the past decade. Anthropogenic carbon dioxide (CO<sub>2</sub>) emissions have been increasing since the industrial revolution, and the impacts of this greenhouse gas have been studied for several decades. Ocean acidification is not affected by global warming, however, and the reduction of other greenhouse gasses will be ineffective in mitigation. The ocean acts as a large carbon sink, absorbing approximately 25% of all atmospheric CO<sub>2</sub>. As CO<sub>2</sub> is absorbed by seawater, carbonic acid is formed resulting in a change in seawater chemistry, which lowers the pH of seawater and alters the relative abundances of carbonate ions, bicarbonate, and hydrogen protons. Until recently, the biological implications of this were largely unknown. Studies on coral reefs and more recently on calcifying phytoplankton, zooplankton and crustaceans have clearly evidenced a significant biological impact; although studies have employed varying methodology and are inconsistent with one another. Organisms with a calcium carbonate shell or exoskeleton have shown to have a marked decline when placed in CO<sub>2</sub> enriched water. Furthermore, increasing levels of CO<sub>2</sub> may produce corrosive water to calcium carbonate structures by 2050. Affected species form the basis of the trophic food web and the implications of unabated CO<sub>2</sub> emissions could be catastrophic to marine biota. Current international programs are addressing Ocean Acidification and are working towards mitigation strategies, although clearly additional research needs to be done in this field. In the United States, the Federal Ocean Acidification Research and Monitoring Act was passed in 2009 and will provide the foundation of national research and policy on this topic.