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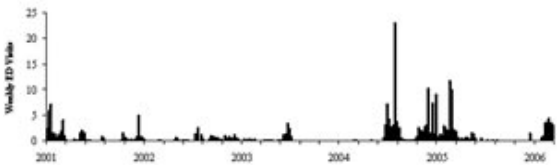
2008 Annual Report: Marine Policy Center

Research at the Institution's Marine Policy Center (MPC) involves the application of economics and other social sciences to public policy issues connected to the world's oceans and coastal areas. Some recent MPC studies have concentrated on estimating the costs to society of marine hazards and identifying and evaluating public policy responses aimed at avoiding or reducing these costs.



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Estimated number of emergency room visits at Sarasota Memorial Hospital for respiratory distress caused by blooms of the harmful algal species *Karenia brevis* blooms.

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One example is a recently completed study of human respiratory disease caused by harmful algal blooms (HABs) off the Gulf coast of Florida. This study was led by Senior Research Specialist Porter Hoagland, Senior Scientist Di Jin, and 2007 Summer Student Fellow Lara Polansky, and included collaborators at the University of Miami, the Mote Marine Laboratory in Sarasota, the Florida Department of Health, and the US Centers for Disease Control and Prevention. The results of the first part of the study, which was funded by the Centers for Ocean and Human Health at WHOI and the University of Miami and the State of Florida, have been published in the journal *Environmental Health Perspectives*.

Annual blooms of the algal species *Karenia brevis* produce substances known as brevetoxins that can be aerosolized and transported from marine waters to the coast. Although it is known that aerosolized brevetoxins can cause serious respiratory problems in humans, the magnitude of the problem has not been well understood, and the first step in the study was to develop a quantitative measure.

In the first phase of this study, researchers used 5 years of data to estimate the relationship between *K. brevis* cell counts in the ocean and non-asthma respiratory cases at a single hospital in Sarasota. The number of emergency room visits for respiratory cases at this hospital averaged around 70 per week. The analysis found that, depending on the severity of the bloom, up to 20% of these could be attributed to brevetoxins. An interesting sidelight of the analysis was the inability to detect a significant relationship between *K. brevis* blooms and emergency room visits for asthma attacks. One hypothesis is that asthma sufferers are more experienced with respiratory distress and do not require treatment in the emergency room.

The second phase of the study focused on the economic cost of emergency hospitalization for HAB-related respiratory illness. A conservative estimate of the costs of cases treated at this hospital alone is on the order of $200,000 per year.

A number of measures are being used to mitigate the brevetoxin problem in Florida. These include efforts to reduce the frequency and severity of the blooms themselves, through restrictions on the use of fertilizers, development of a capability to predict blooms through the use of satellite measurements of chlorophyll in surface waters, and the use of a warning system once blooms occur. In the third phase of this project, these and other policy options will be analyzed in terms of their cost effectiveness.

—Andrew Solow, Center Director

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