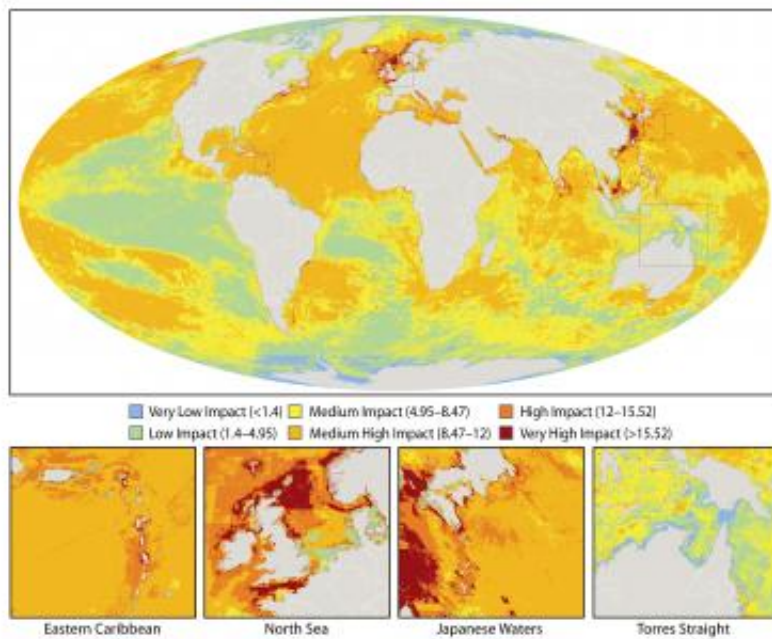


First map of threats to marine ecosystems shows all the world's oceans are affected

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A global map of the overall impact that 17 different human activities are having on marine ecosystems. Insets show three of the most heavily impacted areas in the world [left], and one of the least impacted areas [right]. Credit: Image courtesy of B.S Halpern

As vast and far-reaching as the world's oceans are, every square kilometer is affected by human activities, according to a study in the journal *Science* by researchers at the University of North Carolina at Chapel Hill and others.

The international team of scientists integrated global data from 17 aspects of global change – from overfishing to global warming – that threaten 20 different marine ecosystems, such as coral reefs and continental shelves. Similar to an online satellite map that lets you add layers of highways, retail stores, schools, parks, etc., to find the most congested areas or the highest concentration of fast food restaurants, the global threat map highlights areas in the ocean where threats overlap.

The researchers scored the potential threats – from having very-low to very-high impacts – and found that affects were ubiquitous, and more than 40 percent of the oceans experience medium- to very high-impact threats.

“For the first time we can see where some of the most threatened marine ecosystems are and what might be degrading them,” said Elizabeth Selig, an author on the study and a doctoral student in UNC’s curriculum in ecology in the College of Arts and Sciences.

The study, led by Benjamin Halpern at the National Center for Ecological Analysis and Synthesis in Santa Barbara, Calif., was presented today (Feb. 14, 2008) in Boston at the annual meeting of the American Association for the Advancement of Science.

“This study quantifies the extent of the problems that marine scientists have long known to be issues. But it’s not enough to just know something’s a problem,” said John Bruno, associate professor of Marine Sciences at UNC. “If you want to do something about it you have to know where the problems are and what’s causing them.”

“This information enables us to tailor strategies and set priorities for ecosystem management,” Selig said. “And it shows that while local efforts are important, we also need to be thinking about global solutions.”

Selig and Bruno contributed to the study satellite data on global ocean temperatures. The readings were then used to quantify changes in ocean temperature and estimate the threat from global warming. Such data usually covers areas of 50 square kilometers, but this study used a more precise dataset – down to four square kilometers – that Selig, Bruno and Kenneth Casey at the National Oceanic and Atmospheric Administration have worked for years to develop.

“This new database reveals for the first time the magnitude, geographic extent and precise locations of ocean warming. Armed with new information, the research team can now begin to tackle the bigger problem of understanding and forecasting how ocean warming will impact marine ecosystems,” Bruno said.

Future studies will do just that, focusing on what impact the threats have on coral reefs. Previous work by Bruno and Selig have shown how increases in water temperatures of just one or two degrees Celsius cause coral disease outbreaks.

The Science study showed that rising ocean temperatures are the most pervasive threat, and almost half of all the world’s coral reefs have recently experienced medium- to high-level impacts.

“Millions of people around the world depend on marine ecosystems for their livelihood, whether it’s from fishing or tourism, and millions more are affected by erosion, pollution and other disturbance events,” Selig said. “This information will help us make better management decisions.”

Other ecosystems in the study include sea grass, rocky reefs, deep water and mangroves. Other threats included ocean acidification, direct pollution, commercial shipping traffic and nutrient pollution.

According to the study, large areas of the Arctic and Antarctica have

sustained very-low level impact, but the study did not measure ice melt due to global warming.

Source: University of North Carolina at Chapel Hill

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