Smarter Conservation through Interdisciplinary Understanding

Science is not enough to keep our ocean planet healthy

More than 90 percent of ocean life is invisible to the eye, yet microorganisms in the ocean create about half the oxygen we breathe.

Marine microbes have been key in absorbing and breaking down much of the carbon that we have been pumping into the atmosphere over the last century, but they are falling behind in their ability to keep up with our insatiable appetite for fossil fuels.

When the natural balance of the marine environment is altered, inevitably so is ours.

“\textit{It may be that the oceans are the last, best hope of the earth.}”

– Roger Revelle, former Scripps director and UC San Diego founder

Center for Marine Biodiversity and Conservation at Scripps

Nearly three quarters of the planet is covered by oceans. Life in the oceans encompasses a scale of variation from genes to ecosystems. Healthy and biologically diverse oceans are important to humans, providing food, recreation, pharmaceuticals, and much more. Marine ecosystems that support life on Earth are experiencing chronic overfishing, pollution, species invasion, and the effects of climate change. Healthy coral reefs teeming with sharks, large fishes, sea turtles, and colorful corals are all but gone. Even deep-ocean ecosystems difficult to access and study are affected by human activities.

In the face of rapid and inevitable global change, solutions must cut across traditional academic disciplines and integrate science and policy. The Center for Marine Biodiversity and Conservation (CMBC) at Scripps Institution of Oceanography is a pioneer in this effort. For over a decade, CMBC has brought together world-class marine scientists and climate researchers at Scripps with diverse experts from across fields at UC San Diego.

Our next generation of ocean leaders must have this interdisciplinary understanding. The graduate student curricula fostered by CMBC supplements classic marine sciences with courses in the social sciences, law, policy, economics, and science communication.

Interdisciplinary dialog and thoughtful considerations are critical for establishing the path from science to intelligent policy decisions.
Impacts and Accomplishments

- **Research Impacts.** CMBC research impacts policy and practice. For example, long-term data collection efforts have guided establishment of marine protected areas in the Gulf of California. Results from research in Pacific atolls are cited in policy documents that established the Pacific Remote Islands Marine National Monument. CMBC shark research is cited as an important source for legislation to ban the trade of shark fins in California.

- **Educational Success.** During the last decade more than 100 UC San Diego Master’s and Ph.D. students have been trained in the interdisciplinary approach to address the world’s most challenging marine problems. Graduates have gone on to fill key positions in government, academia, corporations, and NGOs. They provide expertise and advice to our nation’s leaders.

Global Research Issues

**Small-scale fisheries** for subsistence and local small markets are vital to the livelihoods and food security of 150 million people, and collectively catch the same amount as industrial fisheries. Current CMBC research aims to understand the socio-economic and cultural drivers of these fisheries to manage for sustainable harvests.

**The deep ocean** is emerging as a major new source of seafood, energy, minerals, and pharmaceuticals. New CMBC efforts examine the complex biological, climate, and human linkages shaping biodiversity and ecosystem services in the deep sea, promoting multidisciplinary approaches to sustainable management.

**Ocean acidification** and decreasing oxygen levels are combining with ocean warming to stress marine populations and ecosystems. CMBC researchers combine disciplines to understand biological responses from the cellular to organism to community level, seeking to inform policy and remediation.

Sustainability and Human Health

CMBC projects collect data on marine ecosystems in Central Pacific atolls, along the California coast, and deep in the Pacific, and explore the impact of past and modern-day human activities, climate change, and patterns of extinction. Research addresses contaminants at multiple levels, from cell physiology to behavior and communities, to understand toxin accumulation, ecological effects, animal coping strategies, and human vulnerabilities.

Marine Life Conservation

At CMBC, patterns of biodiversity are examined by projects that assess the richness and variety of species close to and far from human activities; the contributions of food webs; and the relationships among biodiversity, ecosystem services, and human health.

Projects establish protocols for selecting priority conservation areas, conducting experimental restoration, developing models for recovery, and communicating the environmental, economic, and social relevance of marine science to the public.

Scripps scientists synthesize decades of research data from diverse sources to guide intelligent decisions and management policies that preserve precious and diminishing marine resources for the future.

Giving Opportunities

- **Name the Center for Marine Biodiversity and Conservation at Scripps**
  - $25 million

- **Interdisciplinary Graduate Student Training - Future Ocean Leaders**
  - $50,000

- **Novel Solutions and Innovations Seed Grants**
  - $20,000-$100,000

- **Director’s Excellence Fund**
  - $5,000 and above

- **Distinguished Speaker in Marine Biodiversity and Conservation**
  - $1,000 and above

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