

Scientists and Evangelicals Share Concerns on Climate Change
Center for Health and the Global Environment at Harvard Medical School
November 17, 2009

Nancy Knowlton, Ph.D.

My name is Nancy Knowlton, and I hold the Sant Chair for Marine Science at the Smithsonian's National Museum of Natural History.

The ocean covers more than 70% of the planet, regulates the climate, and supports most of the major branches on the tree of life. It provides 50% of the oxygen we breathe, and sustenance for the billions of people that live within 50 miles of the world's coastlines, as well as inspiration and relaxation for those who visit.

Yet when it comes to climate change, the threats that greenhouse gas emissions pose to the ocean and ocean life have been comparatively ignored. Indeed, in many discussions, the ocean simply plays its traditional role of absorbing the waste-products of human activity – dilution is the solution to pollution. The ability of the ocean to absorb carbon dioxide is even heralded as a partial remedy for global warming. On the United Nations Copenhagen site, the consequences of climate change listed ignore effects to the ocean, apart from the fact that via sea level rise it will be getting bigger.

In this case, however, Bigger is not better. The threats to the ocean are actually more severe than the threats to the land, because changes in temperature are compounded by changes in pH or acidity, and these in turn aggravate the detrimental effects of local human impacts due to overfishing, pollution and invasive species. Like a family that barely survives the loss of a job of one breadwinner and is thrown into bankruptcy by illness in another, the oceans are being overwhelmed by multiple insults.

Take coral reefs, for example, communities that I have studied for 35 years. When I began my work in Jamaica, the fishes were scarce but the corals themselves were largely intact, so that effective fisheries policies could have quickly restored the ability of these environments to feed the local people. But over the course of a few years, the corals went from covering 70% of the bottom to less than 5%. Now recovery, if it occurs, will take decades. The same changes I witnessed firsthand have now been repeated around the world, and coral reefs, which shelter about one third of all the species in the ocean in a combined space of about the size of Texas, hang by a thread. We have already lost about 80% of reefs in the Caribbean and 50% in the Pacific, and 1/3 of all coral species are at risk of extinction, making them the most vulnerable group of animals on the planet.

Coral reefs are sometimes called the canary in the climate change coal mine because they are so vulnerable to the twin threats of warming and acidification. Yet these are very expensive canaries, worth 30 billion US\$ annually to countries around the world in the form of food, shoreline protection and tourism, not to speak of the unknown pharmaceutical potential associated with these rainforests of the sea. If current trends in greenhouse gas emissions continue unabated, however, coral reefs will cease to exist in any meaningful form by 2050.

The coral reef canary may be lying on the floor of its cage, but in the ocean, we have gone well beyond the canary stage. Recent analyses suggest, for example, that by 2060, shellfish harvests, which represent ~20% of the US fisheries income, will decline by anywhere from 10-25% due to ocean acidification. Even more alarming for food security was a recent

Scientists and Evangelicals Share Concerns on Climate Change
Center for Health and the Global Environment at Harvard Medical School
November 17, 2009

analysis suggesting that warming could drastically increase the extent of oceanic dead zones, substantially decreasing the ability of the oceans to feed humankind.

Because carbon dioxide persists in the atmosphere for centuries, decisions we make today affect not only ourselves, our children, and our grandchildren, but also our grandchildren's grandchildren's grandchildren. Today, oceanographers can measure not only the increase in temperature but also the increase in acidity. Yet, it is not too late to act, and good local management of ocean resources can buy us some time as the needed energy changes are put in place. Massive extinctions have yet to occur, so that no essential pieces have been lost to date. And if you look beyond the doom and gloom, there are many small-scale examples that show the pathway that we can take for large scale success.

I and my students have no interest in writing the obituary for the ocean. But the ocean is speaking and the message is clear: concentrations of carbon dioxide above 450 ppm threaten not only ocean life but also human well-being. Or, as the Smithsonian's Sant Ocean Hall proclaims at its entrance: The ocean is a global system essential to all life - including yours.