Interview with the Chair: Steve Palumbi

Dr. Palumbi is Jane and Marshall Steel Jr. Professor in Marine Sciences and Senior Fellow at the Woods Institute for the Environment at Stanford University.

Q: If you could summarize this report with a headline, what would it be?

A: Research report finds many ways to help coral reefs against climate threats.

Q: Many people have had limited interaction with coral reefs. Why should they care about coral survival?

A: It's not just coral survival that is important, it's also their benefit to humanity. Corals create living reefs that catch up to 97% of the wave intensity that flows over them, protecting shorelines and villages and cities. Coral reefs also provide food for hundreds of millions of people by creating homes for thousands of fish and other species. Nearly a quarter of the world's ocean species live on coral reefs, providing a brilliant array of colors and shapes and sizes that has fascinated every generation since Jacques Cousteau.

Q: We've heard a lot about coral bleaching and loss. What must be done?

A: Coral bleaching has been increasing due to a warming ocean, and so the first thing to do is to stop the warming at its source – excess carbon dioxide (CO_2) in the atmosphere.

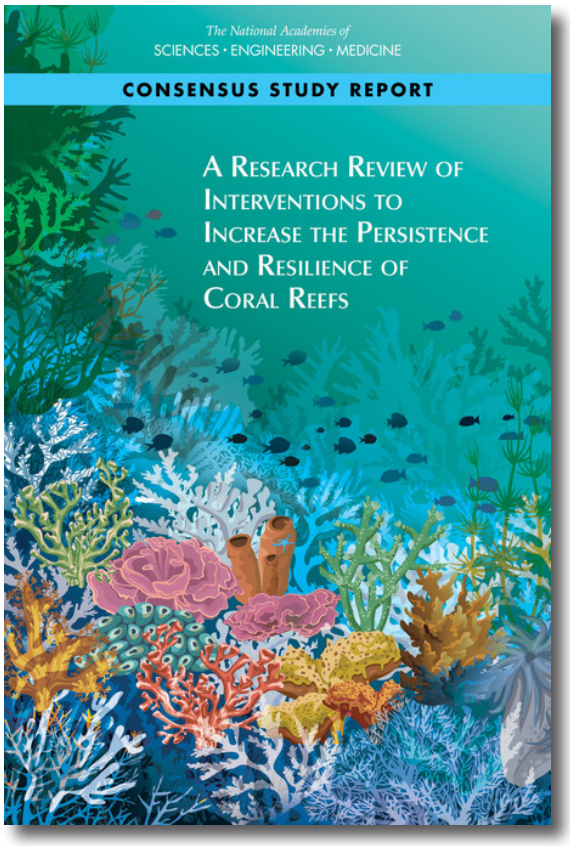
Second, a great deal of the coral decline that has already happened is due to the many local environmental stresses that humanity imposes on corals. Overfishing, pollution, habitat destruction, and sedimentation are common on reefs all over the world, killing corals and destroying reef habitats for fish and invertebrates. Controlling these local stressors has always been a challenge. That challenge is still important, and is required if new interventions to increase coral resilience are to succeed.

Third, this new report shows nearly two dozen different ideas about how to bolster the abilities of corals to survive warming oceans, as well as other stresses. This third strategy seeks to repair damage done already and to prepare coral reefs for the inevitably warming oceans that were are faced with even under successful CO2 control. Some ideas range take advantage of current species or coral colonies that have higher heat tolerance. Others use breeding and molecular genetic approaches to make tolerance even higher. Still others focus on the partners that corals have – their symbionts and microbes. A last set seeks to develop ways to shade, cool, or otherwise protect reefs at a local level. Few of these ideas are 'shovel ready'. Some would require years or even decades to develop at the necessary scale. Some potentially impose unforeseen consequences that must be fully thought out before use. The road ahead is to understand the role these tools might have in securing the future of coral reefs, and to quickly move to use them while reef systems are still part of our oceans.

Q: What gives you hope for reversing the trajectory of coral decline?

A: One of the nearly universal observations after a coral bleaching event is that some corals don't bleach, even right next to colonies of the same species that do bleach. This means that in a coral population, there are some individuals that are stronger in the face of ocean warming. A reef made up of these strong corals would hopefully live longer and grow better and bleach less.

Knowing how these corals remain heat tolerant might also help us assist nature in generating even stronger reefs. Selective breeding for higher heat tolerance, use of more tolerant symbionts, changes to the coral microbiome, pre-conditioning of corals to high heat: all these have shown promise in the lab or in small field trials in generating corals that can live better a higher temperatures.



Q: What are the most surprising ideas that have come from the literature review in the interim report?

A: One of the most surprising is the early success in use and manipulation of coral gametes – for planned crosses, population expansion, larvae rearing, cryopreservation, and other techniques that take better control of the coral reproductive cycle.

Q: What happens next now that this interim report has been published?

A: The report is an opened toolbox; it lists a wide range of possible approaches to a global problem. Next, is to try to get the toolbox off the hardware store shelf. This means that researchers, agencies, and managers will be faced with approaching this list with a practical, 'do no harm' strategy that mixes bold use of new proven ideas with a caution built from the role we play in the legacy of reefs for the future.

The committee's next report will address this need to evaluate the relative risks and benefits of different coral conservation approaches, as well as the risk of doing nothing.

Q: How did you become interested in researching coral genetics and its application to resilience?

A: My first 200 dives were on coral reefs in Jamaica, studying coral reef ecology for several summers. And since then I've watched this reef, and virtually all others in the world, decay under the impact of human stressors and climate change. At the same time I've helped develop a substantial genetic toolbox for understanding the way genomes evolve in marine species. It seemed like a helpful thing to put these genetic skills to use in charting a course for future coral reefs - not only for the purposes of understanding gene evolution in stressful environments, but to open up the possibility that we might have tools to help make coral reefs better.