



Dr. Simon Donner samples an area of the reef.

## Why study coral reef ecosystems?

Coral reefs are more sensitive to climate change than almost any other ecosystem on the planet. Millions of people across the tropics depend on coral reefs for shoreline protection, for food, and for their livelihoods. By understanding how corals respond to rising temperatures, Dr. Simon Donner hopes his research will help these people prepare for a warmer future.

### How does climate change affect coral reefs?

The health of coral reefs ecosystems, the most biologically diverse ecosystems in the ocean, depends on the symbiotic relationship between the coral (an animal) and microscopic algae (zooxanthellae). The corals get most of their energy from the colourful zooxanthellae that live inside of the coral tissue. When water temperatures heat up, however, the corals expel or consume the algae. This “bleaching” process can eventually starve the corals to death and has a trickle-down effect on other organisms in the ecosystem.



Live (colourful), bleached (white) and dead (grey/red) coral.

### How do you measure the effect of climate change on coral reefs?

Simon leads annual field expeditions to the Gilbert Islands of Kiribati. Thanks to the regular warming patterns caused by El Niño, the coral reefs in Kiribati experience more heat waves than any other on the planet. This makes the Kiribati a natural laboratory for testing hypotheses about how rising ocean temperatures affect corals.



The Gilbert Islands are a chain of islands in the Republic of Kiribati, an island country in the central Pacific Ocean.

There, he and his team sample (count, measure, and record) the species in different areas to discover what is living there, and in what numbers. Then, by combining this field data with weather patterns and changes in temperature, Simon can make predictions about the effects of climate change and discover what makes some coral reefs tougher—and more resilient to climate change—than others.



images courtesy Simon Donner