

Minimizing loss of coral reef biodiversity by site triage and short-term protection.

Coral reefs, the most biodiverse habitats on earth, are at risk of virtual annihilation from climate change over the next few decades. Many islands and their cultures exist only because corals build and protect human habitations. Desertification may take vast continental areas out of production, but without continuous coral growth islands can literally disappear beneath rising seas. Coral growth is reduced by both increased temperature and increased dissolved carbon dioxide in seawater, so a reduction in coral growth and range is inevitable in all future scenarios. As the figure shows, the area optimal for coral growth has already dropped to a third of pre-industrial levels, and most regions become marginal in future models. However, the worst conditions are often localized and occur over brief periods. Careful monitoring of both physical conditions and species distributions can minimize the damage to both the corals and the biological and human systems they support. This will require more detailed information linking Sea Surface Temperature to patterns below the surface and about species-specific preferences and physiological constraints, but there is some time to learn about these details. Knowing when and where physical conditions will be most extreme will allow triage to select the most valuable areas to protect. It may even be possible to alter conditions locally over short periods to protect essential diversity by changing flow patterns, insolation or chemistry.

