Effects of environmental stresses on coral bleaching

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Coral reefs are threatened by multiple environmental stresses at both the global and the local scales. Declining water quality in coastal reefs has been reported such as due to red soil runoff, agricultural fertilizers, and anti-fouling chemicals. Coral bleaching has been frequently reported and actively studied recently. The synergistic effects of multiple stressors have also been studied, with several studies reporting accelerated bleaching under conditions of high seawater temperature and low water quality. For example, enrichment of nitrate can accelerate coral bleaching under high light or high temperature conditions compared with single stress conditions. If the concentration of nitrate increases damage to coral reefs in coastal areas could significantly increase under high temperature or high light stress. Moreover, environmental bacteria, *Sulfitobacter* sp., which can be found in the seawater of coral reef, enhanced bleaching process under high temperature. These nitrate and bacteria did not affect corals severely under ambient temperature (not high temperature). To mitigate environmental stresses on coral reefs, it is important to evaluate risks due not only to global warming, but also to local stresses.

Keywords: global warming, coral bleaching, multiple stresses

