



The future of the reef

Background reading for teachers

This reading gives you the background for each slide, with sources you can check.

Philippine reefs

The first nationwide reef assessment in 40 years surveyed 166 randomly selected stations in 31 provinces from 2015 to 2017. None was in excellent condition, more than 90% were poor or fair, and the weighted average hard coral cover was 22%.¹ The fuller 2019 analysis of 206 stations gave an average of 22.8% and found a loss of about a third of reef corals over the previous decade, but no consistent change at 101 monitoring stations between 2015 and 2018, despite the global bleaching event.²

Bleaching

From early 2023 to mid-2025, bleaching-level heat stress affected 84% of the world's reef area, with mass bleaching in at least 83 countries and territories. The earlier global events reached 21% (1998), 37% (2010) and 68% (2014 to 2017). NOAA scientists say reefs are now in an era of near-annual bleaching.^{3, 4} Not all reefs bleached even under high temperatures, which is an active area of research.³ The IPCC projects a further 70 to 90% decline in coral reefs at 1.5°C of warming, and over 99% at 2°C.⁵

Crown-of-thorns starfish

Crown-of-thorns starfish are native coral predators across the Indo-Pacific. Outbreaks are linked to extra nutrients from land runoff, which boosts the plankton their larvae feed on, and to the loss of predators. Their spines are venomous, so removal should only be done by trained divers with tools.

Apo Island

Apo Island's no-take reserve, set up with the community in 1982, is one of the best-studied marine reserves in the world. Over 18 years, the biomass of surgeonfish and jacks inside the reserve tripled, while a fished site showed no significant change, and catch rates were higher near the reserve.⁶ For older students, it is worth adding that the extra catch from spillover was probably modest, and that the biggest benefits were inside the reserve.

The board game

Every card is based on a real threat or action. The Benefit and Threat cards deliberately include local actions (moorings, wardens, planting mangroves in the right place) alongside global ones, so students see that both matter.

Sources

1. Licuanan, A.M. and others (2017). Initial findings of the nationwide assessment of Philippine coral reefs. *Philippine Journal of Science* 146(2): 177-185.
2. Licuanan, W.Y., Robles, R. and Reyes, M. (2019). Status and recent trends in coral reefs of the Philippines. *Marine Pollution Bulletin* 142: 544-550.
3. NOAA NESDIS (2026). World's fourth mass coral bleaching event likely ended in 2025. nesdis.noaa.gov
4. GCRMN (2026). The most intense global coral bleaching event on record has likely ended. gcrmn.net/2026/06/08/4gbe-ended/
5. IPCC (2018). Special Report on Global Warming of 1.5°C, Summary for Policymakers. ipcc.ch/sr15
6. Russ, G.R. and others (2004). Marine reserve benefits local fisheries. *Ecological Applications* 14(2): 597-606.

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