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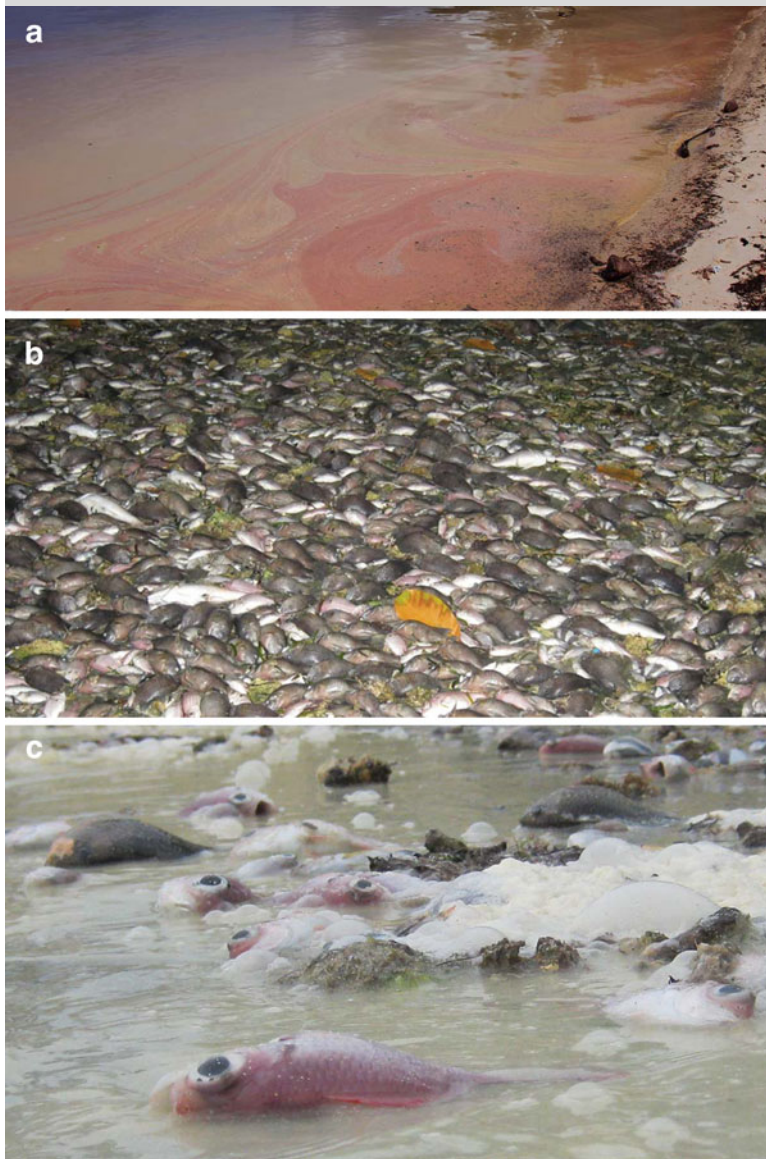
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# Reef sites

## Unusual weather and trapped coral spawn lead to fish kill at a remote coral atoll



**Fig. 1** (a) Coral spawn accumulation, decomposition, and (b, c) subsequent fish kill on the eastern shoreline of the lagoon. Coral spawn photograph courtesy of Brendan O'Brien

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The Cocos Islands (12°12'S, 96°54'E) comprise two remote atolls in the Indian Ocean. The southern atoll supports 26 low-lying islets distributed around a 10-km-wide lagoon. Consistent south-east tradewinds and southerly swell combine to flush the lagoon in a south-east to north-west direction.

Unusual weather conditions occurred during and following a coral spawning event. From 18 to 31 January 2012, winds were much lighter than normal (average = 12.6 km hr<sup>-1</sup> compared to long-term average of 25.3 km hr<sup>-1</sup>) and predominately westerly (Bureau of Meteorology 2012). These conditions stall lagoon flushing (Hobbs and McDonald 2010), and coral spawn slicks (Fig. 1a) were blown into shallow bays in the eastern lagoon where they remained. The subsequent mass mortality of organisms occurred only in these bays (31 January to 2 February) and was probably due to hypoxia caused by a combination of oxygen consumed by coral spawn, oxygen depletion by decomposing coral spawn and other dead organisms, and lack of lagoon flushing (Simpson et al. 1993; Hobbs and McDonald 2010). It is also possible that an undetected mechanism(s) associated with these conditions caused the mass mortality.

Based on shoreline observations, we estimated more than 200,000 fishes died. The highest numbers of dead fish were in the following taxa (descending order of abundance): Pomacentridae, Holocentridae, Gobiidae, Apogonidae, Acanthuridae, Epinephelidae, Labridae, Siganidae, Scaridae, Mullidae, Nemipteridae, Monacanthidae, and Tetrodontidae (Fig. 1b, c). Other notable deaths included blacktip reef sharks, moray eels and various invertebrates (e.g. octopus, crabs). Numerous coral colonies (branching *Acropora* and corymbose *Pocillopora*) died. These taxa are the major habitat-forming corals in this area and their death is likely to have longer term impacts on other taxa that feed on, or inhabit live coral. Furthermore, the breakdown of these corals will reduce habitat complexity. Mass die-off events are a concern at this atoll given its isolation and the local people's reliance on the lagoon for food.

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