

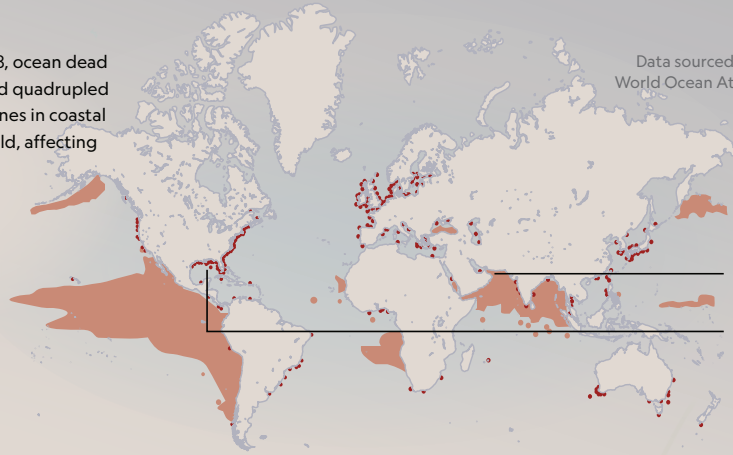
# ANATOMY OF A DEAD ZONE

The term “oxygen producer” might conjure an image of a tree on land, but the world’s oceans contain lots of oxygen producers, too. Marine organisms, such as kelp and phytoplankton, produce more than half of all the oxygen in our atmosphere, as well as much of the oxygen that remains dissolved in the ocean to support marine life. However, in recent decades, scientists have seen an increase in areas of the ocean with too little dissolved oxygen to support life. These lifeless marine regions are commonly called dead zones.

Between 1950 and 2018, ocean dead zones around the world quadrupled in size overall; dead zones in coastal waters increased tenfold, affecting over 500 coastal sites.

Low-oxygen zones (2 mg/L of O<sub>2</sub> or less)

- Coastal
- Open ocean



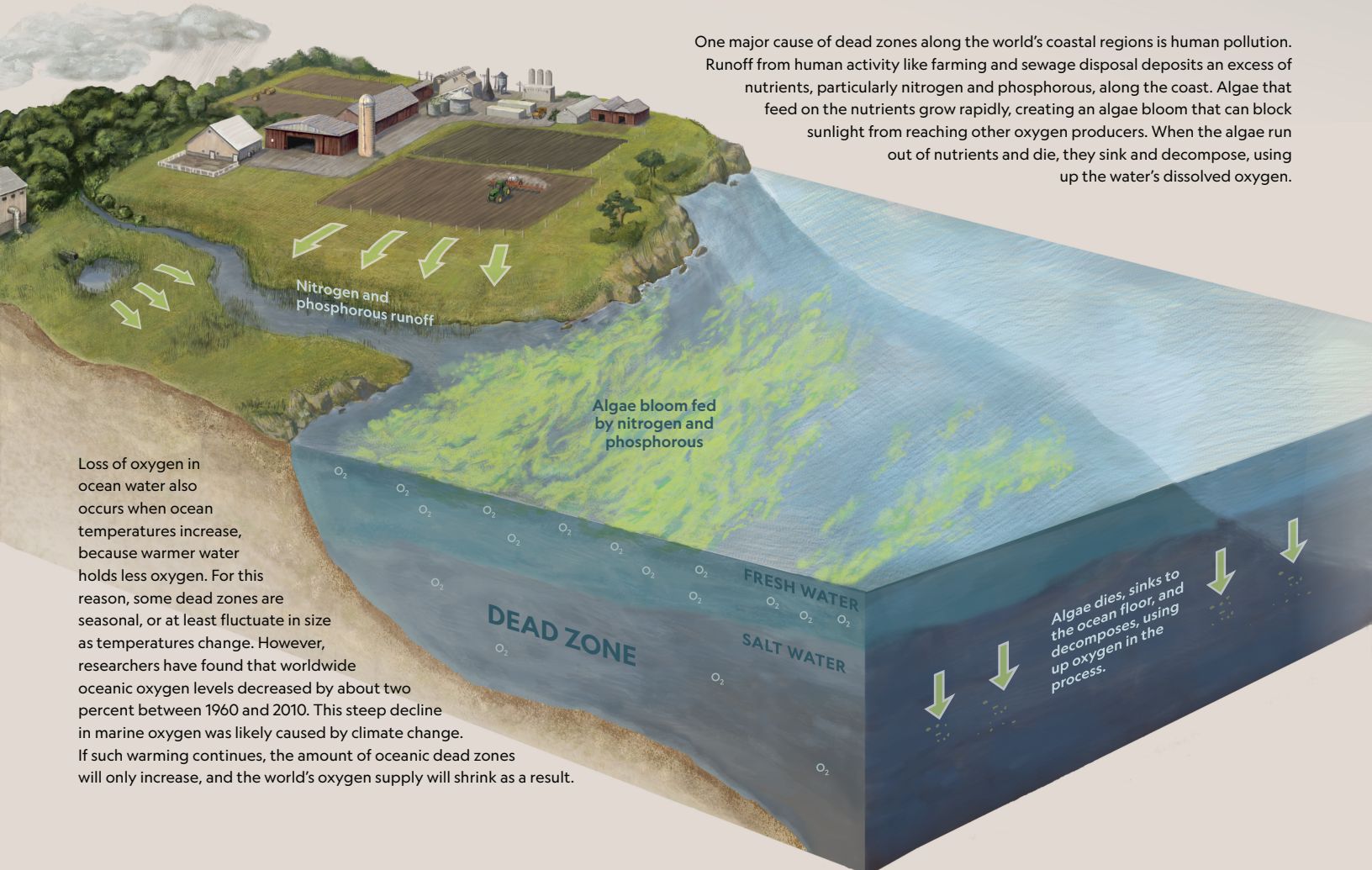
Data sourced from World Ocean Atlas 2013

In 2018, scientists confirmed a dead zone in the Gulf of Oman measuring almost 165,000 square kilometers (63,700 square miles).

The Gulf of Mexico is home to a dead zone measuring thousands of square kilometers.

## Causes of Dead Zones

Dead zones can form for many reasons. In places where fresh water meets heavier salt water, such as where a river empties into the ocean, the two layers have difficulty mixing. This can prevent the more oxygenated upper layer of fresh water from passing its oxygen to the lower layers of salt water.



One major cause of dead zones along the world’s coastal regions is human pollution. Runoff from human activity like farming and sewage disposal deposits an excess of nutrients, particularly nitrogen and phosphorous, along the coast. Algae that feed on the nutrients grow rapidly, creating an algae bloom that can block sunlight from reaching other oxygen producers. When the algae run out of nutrients and die, they sink and decompose, using up the water’s dissolved oxygen.

Loss of oxygen in ocean water also occurs when ocean temperatures increase, because warmer water holds less oxygen. For this reason, some dead zones are seasonal, or at least fluctuate in size as temperatures change. However, researchers have found that worldwide oceanic oxygen levels decreased by about two percent between 1960 and 2010. This steep decline in marine oxygen was likely caused by climate change. If such warming continues, the amount of oceanic dead zones will only increase, and the world’s oxygen supply will shrink as a result.