

Ocean Acidification: Why it's a big deal—and what we can do to help.

What is Ocean Acidification?

Unlike man-made impacts on the atmosphere, which are widely-acknowledged and well-annotated, ocean acidification and its repercussions are largely neglected. However, the issue of ocean acidification is just as far-reaching and waste-inducing: it is often referred to as “global warming’s ‘equally evil twin,’” and its consequences are devastating.

As its name aptly suggests, ocean acidification is the process by which the oceans become more acidic. Wherever water and atmosphere meet, gases are exchanged, and carbon dioxide (CO₂) is absorbed into the ocean. Thus, as humans have increased the amount of greenhouse gas emissions in the atmosphere, they have also increased the amount of CO₂ absorbed into the sea—oceans are now taking in more CO₂ than they are releasing. Since CO₂ dissolution yields an acid, in addition to disrupting the homeostasis of seawater compounds, this imbalance results in a drastic shift in the ocean’s chemical makeup. And since the pH scale is logarithmic, even a miniscule decrease in pH makes for substantial differences in ocean chemistry.

An alternative measurement of ocean acidification takes into consideration not the seas’ pH but their saturation of calcium carbonate. As CO₂ dissolves in water, the carbonic acid it forms “eats” carbonate ions, decreasing overall seawater carbonate levels. This reaction is particularly damaging for coral reefs, which support hundreds of thousands of marine species and are thus instrumental in maintaining ocean biodiversity. Reef exoskeletons are composed of calcium carbonate, so when the saturation of carbonate in seawater decreases, the energy needed for coral reef calcification to occur increases. Additionally, since reefs are continually being damaged by fish and by storms, it is imperative that calcification rates remain steady. However, dropping carbonate saturation levels mean calcification rates are decreasing instead. Such a combination of events is already presenting a grim outlook for reefs and the organisms that call them home. Dropping carbonate saturation levels also have drastic consequences for marine life, especially species which require calcium carbonate to build their shells. Ocean acidification reduces the carbonate ions available for calcifiers to build their shells/exoskeletons/calclitic plates and increases the energy needed for them to do so. This, coupled with the fact that acidic waters are extremely corrosive, leads to the dissolution and deterioration of the solid calcium carbonate that calcifiers have already built, leaving shelled organisms with gaping holes in their shells and other physical deformities. Decreases in population in those marine organisms undoubtably reduce biodiversity in ocean ecosystems, but they also pose the risk of damaging economies that rely on shellfish cultivation and harvest. Fewer shellfish available for harvest translates to fewer shellfish to sell and fewer jobs for those in the shellfishing industry.

Oceans, which cover the majority of earth, are home to a variety of life often unseen but certainly not insignificant to integral industries and to the overall biodiversity of the globe. However, ocean acidification and its repercussions—rising ocean pH, decreasing carbonate saturation—are threatening the existence of ocean species and even entire ecosystems, and something must be done before it’s too late.

What can we do?

On a National Level

Invest more money in scientific research, reduce nutrient runoff, and make efforts to reduce greenhouse gas emissions regionally, nationally, and globally.

On a State Level

Appoint commissions to evaluate the ecological and economic risks of ocean acidification, improving the ability to identify measures to mitigate its effects.

On an Individual Level

Be conscious of your carbon footprint, and reduce your carbon dioxide emissions by taking public transportation, biking, or walking whenever possible.

Learn More

Oceana: What is Ocean Acidification?

<https://usa.oceana.org/what-ocean-acidification>

The Ocean Conservancy: Confronting Ocean Acidification

<https://oceanconservancy.org/ocean-acidification/>