Ocean Acidification Factsheet

It's pretty hard to imagine that us humans are capable of changing the chemical composition of the oceans. But that's exactly what we're doing. It's not great news for our oceans: it seems the chemical composition of the oceans was set at a level that was very comfortable for the organisms that live there. But now that's changing.

It's called ocean acidification, and even if you're not particularly good at chemistry you'll get the general gist of what's going on by reading on.

How is ocean acidification occurring?

While we're pumping carbon emissions into the atmosphere, the ocean is absorbing it - up to a quarter of the carbon dioxide we release each year. Over the last 200 years, the ocean has absorbed around a third of the CO_2 produced by human activities. This has been good news for humans, because it has helped shield us from a rapidly changing climate. But unfortunately it has been bad news for oceans. The level of CO_2 being absorbed in the oceans is changing the chemistry of the sea water, a process called ocean acidification (although at this stage the oceans are still technically alkaline).

The CO_2 absorbed by the sea water is causing a decrease in oceanic pH of 0.1. As CO_2 is absorbed it bonds with seawater and forms carbonic acid. This acid then releases a bicarbonate ion and a hydrogen ion. The hydrogen ion bonds with free carbonate ions in the water and forms another bicarbonate ion.

Prior to the absorption of CO_2, these carbonate ions would have been used by marine animals to make calciumcarbonate shells and skeletons. With more dissolved CO_2 in the ocean, there are less free carbonate ions available for making calcium carbonate.

Scientists believe that the current pH of 8.2 (alkaline) could fall to about 7.8 (still slightly alkaline) by 2100.

While there may be some animals that are able to adapt to the changes in ocean chemistry, we just don't know what sort of impact ocean acidification will have on the ocean at large. We don't know if sea creatures will be able to adapt to the increase in acidity. There is a chance that their numbers will be significantly depleted.

This depletion could have a knock-on effect for all those species that depend on shellfish and coral reefs for survival. That's a lot of species. One in four species in the ocean live and depend upon coral reefs for survival. If those ecosystems start to decline and those species go hungry, then what happens?

Not only is it an issue for marine creatures, but it's also an issue for the millions of people around the world who depend on the oceans for food and livelihoods.

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Timescale

Future predictions suggest that by 2050, the ocean acidity could increase by 150%. This is far faster than previously predicted. Already the impact of carbonic acid in oceans is being observed in various sites around the world. It is moving faster than any other change in acidity in the oceans over the last 20 million years. This could mean that organisms in the ocean have little chance of adapting.

What can be done?

It's hard to put a positive spin on something as devastating as ocean acidification. However, anything that needs to be done can be done by us humans; no matter where we live we can do something to help stop ocean acidification:

Improving the health of the oceans is an important step. Creating marine protected areas (essentially national parks for the sea) and stopping destructive fishing practices would increase the resilience of marine ecosystems and help them withstand acidification.

Evidence suggests that coral reefs in protected ocean reserves are less affected by global threats such as global warming and ocean acidification, demonstrating the power of ecosystem protection.

Ultimately, though, reducing the amount of CO_2 absorbed into the oceans may be the only way to halt acidification. The same strategies needed to fight global warming on land can also help in the seas.

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