OCEAN ACIDIFICATION FACTSHEET

It's pretty hard to imagine that us humans are capable of changing the climate (oh, hello climate change!) but it's also hard to imagine that we could change the chemical composition of the oceans. But that's exactly what we're doing.

Clever us, you might think. Well no, not quite. This is an unintended result in the world's largest chemistry experiment. It's also 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.

So what are we talking about? 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.

WHAT IS CLIMATE CHANGE?

CLIMATE CHANGE IS A CHANGE IN THE PATTERN OF WEATHER, AND RELATED CHANGES IN OCEANS, LAND SURFACES AND ICE SHEETS, OCCURRING OVER TIME SCALES OF DECADES OR LONGER. IT IS TRUE THAT THE CLIMATE HAS CHANGED MANY TIMES IN THE PAST; HOWEVER, THE CLIMATE CHANGE WE ARE EXPERIENCING NOW IS BELIEVED TO BE A RESULT OF HUMAN ACTIVITY. RISING LEVELS OF GREENHOUSE GASES – PARTICULARLY CARBON DIOXIDE (CO_2) – CAUSED BY THE BURNING OF FOSSIL FUELS, ARE HEATING THE ATMOSPHERE TO AN EXTENT WHERE THE CLIMATE IS CHANGING.

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).

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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 sea water 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 calcium carbonate shells and skeletons. With more dissolved CO_2 in the ocean, there is 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.

The image below from the Climate Commission shows the cause and effect of ocean acidification.

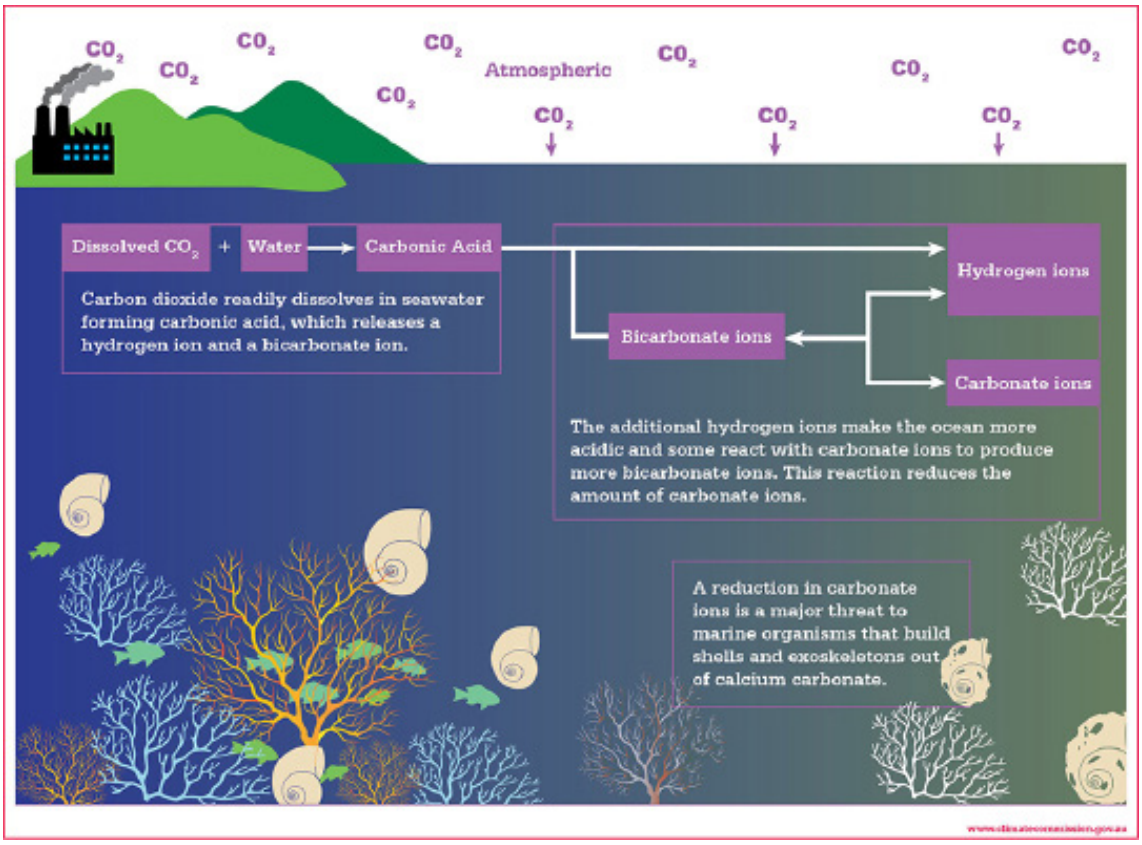

Image source: *Climate Commission*

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 these creatures will be able to adapt to the increase in acidity, and there is a chance that their numbers will be significantly depleted.

This has 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.