

# Global Climate Change

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It's not a hoax. Climate change, ocean acidification, and sea level rise are all real, and they're happening right now. If humans never existed, this would never have been a problem. We need to fix it before it's too late.

## Climate Change and Ocean Acidification

The pH levels of the ocean are falling, due to the burning of fossil fuels. That means that the ocean is becoming more acidic. When fossil fuels are burned, carbon dioxide, a greenhouse gas, is released into the air, causing the atmosphere to heat up. Some of the carbon dioxide is absorbed by the ocean. The carbon dioxide reacts with the water and makes carbonic acid in order to achieve chemical equilibrium. The extra carbonic acid molecules react with the water molecules to form hydrogen and bicarbonate ions, resulting in a more acidic water. According to NOAA, every hour we dump one ton of carbon dioxide into the ocean. The more acidic water has a great impact on marine organisms. Many marine organisms have been negatively affected by climate change ocean acidification, including coral, mollusks, and crustaceans. The growth of coral reefs has been greatly affected by climate change and ocean acidification.

When corals are stressed from changes in conditions such as temperature, light, or nutrients, they expel the symbiotic algae living in their tissues, *zooxanthellae*. These algae are the coral's primary



Photo from <https://sites.psu.edu/ichen/2016/04/12/warning-coral-bleaching/>

food source and give them their color. When the algae are expelled, the coral turns white, and eventually dies.

In addition to that, ocean acidification is greatly affecting marine organisms with shells or skeletons that contain calcium carbonate. That includes many mollusks, crustaceans, and corals. We learned from the coral lab that coral dissolves in a more acidic water. We placed a piece of coral in vinegar, and weighed it before and after. We saw a significant difference in the weight of the coral after it sat in vinegar just for a day. Coral reefs and many mollusks and crustaceans are losing their hard shell. Many different shellfish have been dying across the world. This is greatly disrupting the food chain. Many animals who depend on coral reefs will be vulnerable. There is going to be a mass extinction.

Climate change and ocean acidification are both caused by humans. According to NASA, there is already more than 400 ppm in the atmosphere, a number which wouldn't believe the world would reach for decades. Ice cores hold the evidence that shows that the carbon dioxide level has never been greater than 300 ppm in the natural warming and cooling cycle of the Earth.

## Ice Core Research

An ice core is a cylinder of ice removed from an ice sheet, typically from the polar ice caps from Antarctica, Greenland, or glaciers elsewhere. According to Scientific American, "Scientists can study Earth's climate as far back as 800,000 years by drilling core samples from deep underneath ice sheets of Greenland



Photo from <http://waisdivide.unh.edu>

and Antarctica." Inside the ice core there can be gas bubbles that indicate that there was a lot of carbon dioxide in the atmosphere at some time. Scientific American also says, "Current polar records show an intimate connection between atmospheric carbon dioxide and temperature in the natural world." For example, if one rises, the other one follows.

## **Sea Level Rise**

Global warming doesn't only affect temperature, it also raises sea level. When ice shelves melt, it causes sea level to rise. This can be a major problem to many organisms who depend on beaches. Some of these organisms are sea turtles. Sea turtles lay their eggs on land. The females return to the same beach where they hatched from in order to nest. With sea level rise, part or all of the beach that they return to will be submerged. If the eggs get covered with salt water, they will die. Even if sand is affected on the beach, they will feel the difference between the new sand and the sand that was originally there. They will feel uncomfortable or threatened and leave. This, and all of the other threats to sea turtles, will threaten all of the sea turtle species.

The sea level is increasing fast enough, but it keeps getting worse. The albedo effect is when sunlight is reflected off of the Earth's surface back into space. Ice and snow are very reflective, so when the ice shelves melt, all of the ice and snow turns into water. The Earth loses some of its albedo, so this causes temperatures to rise even more, so more ice and snow melts, and this causes temperatures to rise again. This cycle is a positive feedback loop. These many dilemmas are yet to be solved, but there is still a way to slow them down.

## **How To Help**

Carbon pollution is the enemy in both climate change and ocean acidification. If we want to slow down climate change, ocean acidification, or sea level rise, we all need to reduce our carbon footprint. If we're going to reduce our carbon footprint, we can start by using less energy

at home. It's better for the environment and saves money. Turn off lights and unplug devices not in use. Use energy efficient light bulbs, install solar panels, or use other kinds of green energy such as wind power. Compost your waste or grow some of your own food.

You should also use less plastic, and drive and fly less. Don't get bottled water, don't use straws. Drink tap water. Use reusable grocery bags. Also ride bikes to get around, and if you have to drive, carpool. A 2-mile car trip releases 2 pounds of carbon dioxide into the atmosphere. Take public transit if available.



Photo from <http://news.stanford.edu/news/2011/december/extracting-carbon-air-120911.html>

Recycle everything you can. Reuse what you can, and conserve water. A lot of energy is used to pump, treat, and heat water. If you save water, it will reduce greenhouse gas emissions. Watch what you pour down the drain because it all ends up in the ocean. Use products that are safe for the environment.

Eat less meat. Livestock farming is the biggest cause of climate change and ocean acidification. It produces more greenhouse gases than all forms of transportation combined. Producing food for the livestock uses a lot of fuel, pesticides, fertilizer, land, and water. When the fertilizer is applied to the soil, nitrous oxide is released into the air. Nitrous oxide has three hundred times the warming effect of carbon dioxide. Animal waste also produces methane, a greenhouse gas, and this warms up the planet even more. Eat lots of vegetables, which also will limit animal suffering and is typically healthier.

Buy less and choose a green career and lifestyle. Manufacturing and transporting products produces a lot of carbon dioxide. If you have to buy something, choose something local, safe for the environment, and with less packaging material.

Most important of all, spread the word. Educate everyone. We all want to slow climate change and ocean acidification. Climate change is not a hoax.

# Bibliography

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