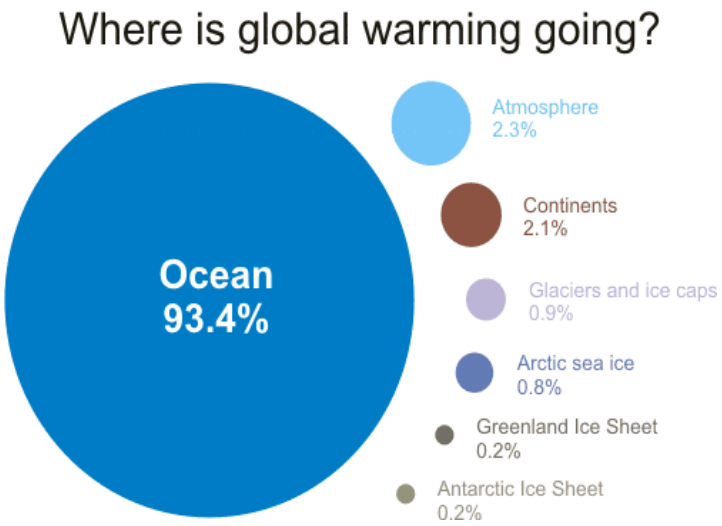
Warming Oceans

Our oceans are the frontlines of the climate crisis, having absorbed over 93% of the excess heat from greenhouse gas emissions since the 1970s, according to the IPCC's Fifth Assessment Report. (Core Writing Team, 2014)

Sea level rise

As water warms, it expands, a process known as thermal expansion. Thermal expansion has contributed to about a third of SLR since 2004, according to NASA. Ocean warming also contributes to glacial melting because glaciers don't just melt from warmer surface air temperatures, but can also be greatly affected by warmer waters underneath, as highlighted by this National Geographic article. (Borunda, 2019). [to learn more about SLR, click here. To learn about strategies to adapt to rising waters, click here]



Skeptical Science (Cook, 2010)
Diagram displaying where GHG heat is absorbed

Acidification

The absorption of CO2 in seawater causes it to become more acidic. As global warming continues, the PH in our oceans is decreasing. Molluscs such as oysters rely on calcium carbonate to form their outer shells, as do corals for their skeletons. But, CO2 reduces the amount of available carbonate ions in the water, which are necessary to combine with calcium to form the hard calcified structures these organisms depend on for survival. (NOAA, 2020) Moreover, acidic waters can dissolve existing shells. Die-offs of these organisms will have devastating consequences on oceanic ecosystems as a whole as species higher up on the food chain lose their food sources.

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Deoxygenation

Ocean deoxygenation is the decrease of oxygen levels in the ocean. It is caused in part by warmer waters because oxygen is less soluble at higher temperatures (Xylem), and because of ocean stratification. Ocean stratification describes a phenomenon in which water of different properties becomes separated, as opposed to thoroughly mixed. When warming causes ice melt leading to freshwater run-off, a layer of less salty, and therefore less dense water sits at the surface of the ocean. This division of the water into layers reduces nutrient mixing. As a result, there are less of the oxygen-producing, photosynthetic organisms who feed off of these nutrients near the ocean's surface.

> More than half the oxygen you breathe comes from the ocean.

In fact, phytoplankton, the microscopic, photosynthetic, ocean-dwelling organisms that mostly stay near the ocean surface and produce oxygen as a byproduct of photosynthesis, are responsible for over half the oxygen we breathe. (Morsink, 2017) Thus, these tiny creatures are indispensable to the oceans and to us humans. Yet, since 1950, ocean warming has killed 40% of phytoplankton. (Watts, 2017) and future climate warming is likely to reduce their populations even more, according to this Scientific Reports article. (Gittings et al, 2018)

Impacts on marine life and humans

Rising temperatures causes coral bleaching and disrupts the lifestyles of fish and other aquatic animals. Many species are going extinct because they can't handle the hotter waters. (Nunez, 2019)

Humanity depends on the ocean for the air we breathe, the food we eat and for many, their economic livelihood. Unchecked ocean warming will spell fishery collapse. Whether you realize it or not, we all rely upon our oceans maintaining their ecosystems and supporting the life it teems with, so it is in our best interest to protect our oceans.

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