

OCEANS

So let's start from the bottom. Phytoplankton! Phytoplankton are some of Earth's most critical organisms and so it is vital to study and understand them. They are mostly microscopic, single-celled photosynthetic organisms that live suspended in water. Like land plants, they generate about half the atmosphere's oxygen, as much per year as all land plants. Phytoplankton also form the base of virtually every ocean food web. In short, they make most other ocean life possible. They sustain krill (a crustacean similar to a tiny shrimp), which in turn sustain wildlife such as baleen whales and Adélie penguins.

Among the diverse kinds of Phytoplankton are photosynthesizing bacteria (cyanobacteria), plant-like diatoms, dinoflagellates, green algae, and chalk-coated coccolithophores. Photosynthetic bacteria cells, some only a micron across, are invisible but [present in numbers of hundreds of thousands of cells per tablespoon of ocean water](#). Too small to be caught in any net, these organisms were unknown until the 1970s, when improved technology made them visible. Scientists now know these bacteria are responsible for half of the ocean's primary productivity and are the most abundant organisms in the sea.

Note that plankton absorb carbon dioxide like a tree, and when they die, they sink to the bottom of the ocean and that carbon is locked away for thousands of years.

So what does climate change have to do with all this?

As the climate warms, so will the oceans—bad news for phytoplankton, since warm waters contain less oxygen, and therefore less phytoplankton, than cooler areas. Already, gradually warming ocean waters have killed off phytoplankton globally by a staggering [40 percent since 1950](#).

Predictions are that phytoplankton along the North Atlantic coast will migrate toward cooler waters off the coast of Greenland. This would cause marine life to move with it (or die, should organisms fail to adapt quickly enough to the change in their environment), and that has the potential to affect fisheries and other economies in the coastal areas. But more worrisome, loss of phytoplankton would mean more carbon dioxide trapped in the Earth's atmosphere.

Among many other topics we should be aware of, there has been a decline in the Adélie penguin population by an order of magnitude, [attributable to the decline of plankton](#), and thus krill, upon which they depend. This is akin to the canary in the mine.

All of this does not diminish the disturbing predictions of flooding due to rising ocean levels. Coastal cities will be inundated, and large areas such as [Bangladesh](#), dependent on agriculture, will be devastated. With rising sea levels, the effects of storm surge is also magnified. Efforts to alleviate these effects can and should be made, and we all must encourage them.