

GLOBAL WARMING:

WHAT IS HAPPENING IN THE OCEAN? HOW DO OCEANS AFFECT WORLD CLIMATE?

Resources: https://web.uri.edu/smile/files/Week-4_-_How-the-oceans-affect-world-climate.pdf
<https://climatekids.nasa.gov/ocean/>

Why is the ocean important?

The ocean is important and covers ___% of Earth's surface. In some places, the ocean is deeper than the tallest mountains are high. The ocean contains about ___% of all the water on Earth.

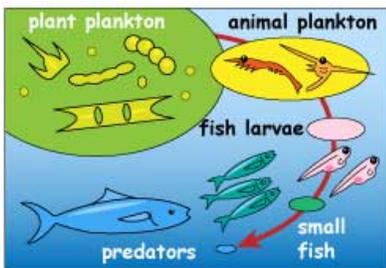
The ocean soaks up heat energy and distributes it more evenly around the Earth.

How does the ocean soak up energy?

Just like it is very unlikely for a water balloon to burst, it teaches us that the ocean does an excellent job of _____ excess heat from the atmosphere. The top few meters of the ocean stores as much heat as Earth's entire atmosphere. So as the planet warms, it is the ocean that absorbs most of the extra energy.

But if the ocean becomes too warm, then the plants and animals that live in it must adapt—or _____.

Algae and plankton are at the bottom of the food chain. Plankton includes many different kinds of tiny animals, plants, or bacteria that just float and drift in the ocean. Other tiny animals such as krill (somewhat like little shrimp) eat plankton. Fish and even whales and seals feed on the krill. In some parts of the ocean, krill populations have dropped by over __%. Why? Krill like to breed in really cold water near sea ice. What would happen if there was no sea ice? What would happen if there were very little plankton or krill? The whole food web could come unraveled.



(Fig. 1) In the ocean, all creatures depend on the supply of plankton (tiny plants and animals) at the bottom of the food chain.

Coral is another ocean creature in trouble. Coral is a very fragile animal that builds a shell around itself. It lives in harmony with a certain kind of colourful algae. The algae make food using sunlight, a process called _____. They share the food with the coral, and, in turn the coral gives the algae a safe and sunny place to live. The two of them have a symbiotic relationship, living in clean, clear, shallow waters where the sun shines brightly. Fish love coral too, because there are plenty of nooks and crannies for them to hide.

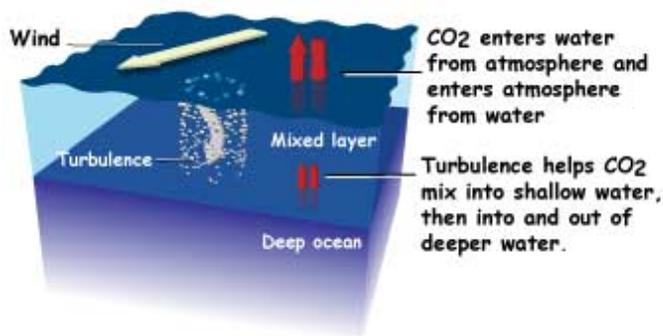


(Fig. 2) This coral (on left) has lost its algae, and thus its food source. It is sick and will probably die.

Algae cannot carry out photosynthesis in water that is too warm. The algae either die, or the coral spits it out. Scientists are not sure exactly what happens, but it is bad for the algae, the coral, and the fish. The corals lose their colourful food sources and become weak. This sad event is called _____, and it is happening on a grand scale in many places around the world.

How does the Ocean absorb CO₂?

Fish and other animals in the ocean breathe oxygen and give off carbon dioxide (CO₂), just like land animals. Ocean plants take in the carbon dioxide and give off oxygen, just like land plants. The ocean is great at absorbing CO₂ that we humans create when we burn fossil fuels (oil, coal, and natural gas). If not for the ocean, we would be in even worse trouble with too much CO₂.

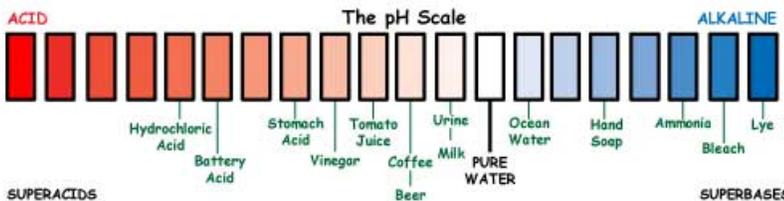


(Fig 3) The ocean absorbs carbon dioxide from the atmosphere

wherever air meets water. Wind causes waves and turbulence, giving more opportunity for the water to absorb the carbon dioxide.

However, the ocean and everything in it are paying a price. The ocean is becoming more acidic.

What does this mean? Liquids are either acid or alkaline. Each liquid falls somewhere along a scale with acid at one end and alkaline at the other.



(Fig. 4) Normally, ocean water is less acidic than fresh water.

Unfortunately, as the ocean absorbs more and more carbon dioxide from the atmosphere, it becomes more acidic. Lemon juice or pop is an example of an acidic liquid. Toothpaste is alkaline. The ocean is slightly alkaline.

However, when the ocean absorbs a great amount of CO₂, the water becomes more acidic. The _____ of the ocean is very important in maintaining a delicate balance needed for animals – like mussels – to make protective shells. If the water is too acidic, the animals may not be able to make strong shells. Corals could also be affected, since their skeletons are made of the same shell-like material.