FURTHER EXPLORATIONS ON THE SUBJECT:

The ocean is one of the earth's final frontiers.

We know more about the moon than our oceans. We've only explored 5% of the ocean, meaning that there is so much more to discover. Those discoveries could be valuable to us all.

Organisms that live on coral reefs are major sources of new drugs, including treatments for cancer, arthritis, asthma, AIDS, and other diseases. The cone snail, for example, may be small but can provide some serious pain relief.

Imagine what else we'll discover as we continue to explore what's under the waves.

Corals have huge environmental and economic value.

At least half a billion people directly rely on healthy coral reefs for food and livelihood.

Coral reefs provide habitat for fisheries, create tourism opportunities and provide natural protection from big waves that cause coastal erosion.

The full environmental and economic value of coral reefs is estimated at **$375 billion per year.**

Corals are in hot water, and we need to help.

Scientists around the world are taking action to save corals for the future. Some are collecting the "seed banks" to preserve the biodiversity of the corals. Others are designing reef restoration projects or examining how to genetically alter corals so that they can be more resilient.

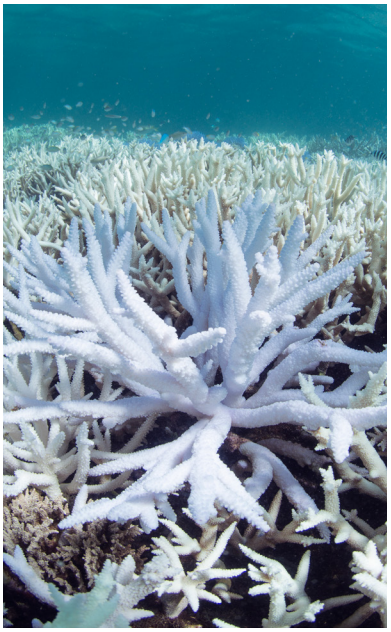
Ultimately, we're trying to preserve these fragile ecosystems the best we can, while we also focus on the larger solution: accelerating climate action.

RESOURCES TO LEARN MORE:

Corals are some of the world's most mysterious creatures. While we're constantly learning more about these fascinating animals, check out these resources to learn about what we do know now:

- **HHMI Interactive science education materials:** A resource for a host of free science education resources from coral bleaching activities to biodiversity in the age of humans.
- **Smithsonian Ocean Portal.** An interactive and educational web platform about corals, coral reefs, symbiosis with educational tools and resources for educators.
- **Coral Seed Banks.** Science Friday podcast: Marine biologist Mary Hagedorn aims to bank as many corals as possible for future restoration and research.
- **National Marine Sanctuaries.** Take a virtual dive.
- **Coral City.** Watch this mesmerizing video about corals in Miami by our friends at Coral Morphologic.
- **Reviving the Ocean Economy: The Case for Action, WWF.** This definitive report by the World Wildlife Fund examines the economic value of the world's oceans putting the value of $24 Trillion on ocean assets and function.
- **50 Reefs.** Continue on Richard's journey. A new initiative dedicated to the protection of coral reefs through conservation and investment with an eye toward repopulation of coral reefs over time.
- **TNC Reef Resilience.** The Reef Resilience Toolkit provides the latest information, guidance, and resources to help managers address the impacts of climate change and local threats to coral reefs.

FURTHER EXPLORATIONS ON THE SUBJECT:



What's coral bleaching? And what's causing it?

Corals are incredibly complex, and need very specific conditions to survive. If their environment gets too hot, the coral animal bleaches white, and is likely to die.

Why does this happen? It basically comes down to how the coral gets its food. The algae that lives inside coral tissue is also its most important food source. The catch is that those algae rely on a narrow range of temperature. If the water gets too warm for too long, the algae freak out and begin producing toxins rather than food.

When this happens, the corals get rid of the algae as fast a possible (just like humans with a bacteria). This is called bleaching because all that is left is the transparent tissue and the bright white skeleton underneath.

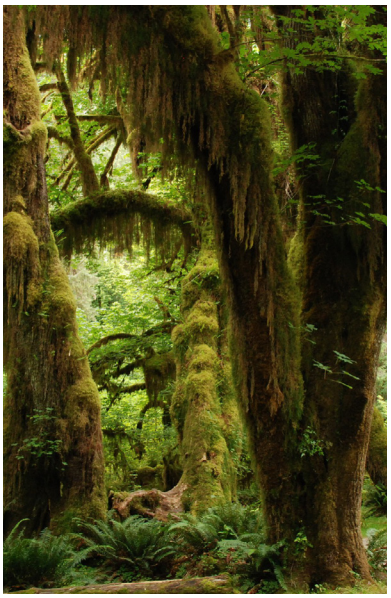
Photo credit: XL Catlin Seaview Survey

What's climate change got to do with coral bleaching?

There are two important facts here. First, carbon dioxide released by burning fossil fuels (like coal, oil and gasoline) is the single biggest cause of the warming of our atmosphere. Second, 93% of the heat from the atmosphere is absorbed by the ocean. Yes, 93%!

"It's a bit like putting extra wool in your sweater," said our chief scientific advisor, Dr. Ove Hoegh-Guldberg. If there's more heat than marine life can tolerate, we see corals bleach, and then the major impacts on the ecosystems that depend on them.

So, if you want to see the impact of climate change, take a look under the waves. What you'll find will give you a good sense of what lies ahead.



From changing corals to melting ice, what are some of the other climate impacts we're seeing?

Chasing Coral and *Chasing Ice* shared what's happening under the waves and in the arctic, but unfortunately, other ecosystems are also facing new challenges.

For example, Canadian grasslands have the highest concentration of species at risk, the Amazon rainforest is experiencing drastic changes to its rivers and lakes and the Middle East continues to face exacerbated droughts.

From sea-level rise to droughts to flooding, we're all experiencing the impacts of climate change in our own backyards -- a reminder of the ever-more urgent need to accelerate climate solutions today.

RESOURCES TO LEARN MORE:

Educational materials on coral bleaching:
HHMI Interactive science education materials: A resource for a host of free science education resources on coral bleaching activities and other interesting topics.

More reading on climate change:

- Short Answers to Hard Questions About Climate Change
- Tips for conversing with climate skeptics.
- 14 Easy Ways to Reduce Your Carbon Footprint.
- Paris agreement's 1.5C target 'only way' to save coral reefs, Unesco says

What to watch next:

- Chasing Ice
- From the Ashes
- Racing Extinction

FURTHER EXPLORATIONS ON THE SUBJECT:

How do we limit the earth's warming?

We need to reduce our carbon emissions, by accelerating climate solutions that benefit us all.

Fundamentally, that means we need to advance the process of making clean energy widely available. Which means it needs to get cheaper.

How do we make these technologies cheaper? We scale them.

In short: as with any technology, prices drop as the industry grows, which means we need to make our demand loud and clear.

Photo credit: UNclimatechange

There are many exciting new innovations and technologies. We need to accelerate them, and fast.

There's lots of positive change. The cost of solar and wind power, electric vehicles and energy storage is going down.

In his 2017 book Drawdown, Paul Hawken describes 100 solutions that are feasible, affordable and can be scaled to meet mass demand such as rooftop solar panels, auto-tinted smart glass, fuel efficient air transport, marine permaculture and bioplastics.

And perhaps the most important innovation of all: changing how we think. Rather than pointing fingers, our collective embrace of the opportunities ahead is what will ultimately fuel this great transformation.

Photo credit: mma Gilchrist, DeSmog Canada

A global movement and you.

At the highest level of commitment is the 2015 Paris Climate Accord, an international agreement that 195 countries adopted to reduce greenhouse gas emissions and limit global warming to 2 degrees Celsius below pre-industrial temperatures.

In parallel, we're also seeing an exciting groundswell of energy at the city and state level. Since June 2017, 343 U.S cities, and thousands of companies and universities have committed to meet these Paris targets. Others are going even further by committing to go 100% renewable. Now, we need to make this momentum unstoppable.

Check out Act to find out what you can do.

RESOURCES TO LEARN MORE:

- **Drawdown.** Paul Hawken's Drawdown assumes the answers to climate action exist. His book and accompanying Drawdown Project outlines 100 successful efforts already in place around the world that can be imitated and amplified to make real, measurable change.

- **Global Covenant of Mayors for Climate and Energy.** A global network of cities and local governments committed to voluntary action to achieve climate goals and move toward a green, low emissions and resilient economy.

- **Climate of Hope.** A new book by Michael Bloomberg and Carl Pope that takes an optimistic look at climate solutions.

- **Growth in Clean Energy Sector.** A report by Environmental Defense Fund that looks at trends in wind, solar and the transition to clean energy in the US.