

WE ARE GOING TO CREATE A
A GLOBAL HIGH SEAS MARINE PRESERVE

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Welcome Environmental Warriors,

You have been chosen by your professors because of your scholarship and attitude. We are embarking on a quest to make a big difference. Young people like you are going to lead humanity into this century. From your research you understand the numerous environmental problems facing our small planet. Your goal as interns and environmental warriors is to look for numerous solutions to solve human created environmental problems.

Be confident and lead your families and friends to a more sustainable life. The example you set is what will make the difference. Teach your families, friends, and communities about the importance of good nutrition, careful purchasing of consumer goods, and staying physically and mentally healthy with proper exercise.

You are environmental warriors. You are brave as well as brilliant. The example you set is what is going to save life on our small planet. Like all generations before you, there is the challenge of survival. We are at war. It is the most important battle in human history. We are literally fighting to save the world from a dystopian future.

At times you will be worried, stressed about your future, your family, the destruction of wildlife and the global environment. You wonder where you will work and how you can make a difference. Economic and agricultural issues are directly related to the environment. We will succeed in our battle to save the wildlife, clean up the planet and create a safe, secure future.

Like my father's generation that fought and won a world war against fascism, we will succeed because we must. Success is the only option. We will prevail because our cause is just. If you are spiritual, then understand that the Creator of the Universe will help us. To prevail, we need to study, research solutions, work together and share our findings with the world.

We wish all of you a wonderful, positive internship experience.

Sincerely,

A handwritten signature in black ink, appearing to be a stylized name with a long horizontal stroke at the end.

President

Global High Seas Marine Preserve

CHAPTER ONE

THE LAW OF THE SEAS

“Law approximates a body of rules that are approximately enforced.”

Francis D. Wormuth, Ph.D.

Law is a fiction. It exists because we believe it exists. This shared consciousness is a set of rules. Most of the time, we obey them. What our organization will accomplish is work to change international law to protect the ocean’s wildlife. The path to reaching this important goal in human evolution is laid out by centuries of legal work. Maritime law has had centuries to develop.

Marine law, also known as admiralty law, has a rich and fascinating history dating back to the earliest days of seafaring. It’s a unique legal system that governs everything from collisions and salvage to piracy and environmental protection. Like all international law, this area is evolving.

As interns, please study international and national marine laws. We are working on amending the Law of the Seas Treaty. The goal is to create a Global High Seas Marine Preserve. That change in the international law will save the ocean’s wildlife.

Ancient Beginnings:

- The earliest documented maritime laws originate with the Rhodian Sea Laws. These set of laws were developed by the island of Rhodes around 900 BC. These laws covered a wide range of topics, including ship collisions, salvage, and bottomry loans. They were highly influential and formed the basis for many later maritime legal systems.
- Other ancient civilizations, such as the Phoenicians, Greeks, and Romans, also developed their own maritime laws. These laws were often based on custom and practice, rather than formal written codes.

Medieval Developments:

- In the Middle Ages, the Consulate of the Sea, a collection of maritime customs developed in the Mediterranean, became increasingly important. The Consulate was eventually adopted by many European countries and remained a major source of maritime law until the 19th century.
- In England, the development of common law gradually led to the creation of a separate body of admiralty law. The English Admiralty Court, established in the 14th century, had jurisdiction over all maritime matters.

19th and 20th Centuries:

- The 19th and 20th centuries saw a period of rapid growth and change in maritime law. This was due in part to the development of new technologies, such as steamships and airplanes, which led to an increase in maritime trade.
- **International Treaties** and conventions also played a major role in the development of maritime law. The most important of these is the **United Nations Convention on the Law of the Sea**, (UNCLOS) which was adopted in 1982. The UNCLOS is a comprehensive agreement that governs all aspects of the use of the oceans. (Website https://treaties.un.org/Pages/Treaties.aspx?id=21&subid=0&lang=en&clang=_en)

Today:

- Marine law is a complex and constantly evolving body of law. It is essential for the safe and efficient operation of the maritime industry and for the protection of the marine environment.

Here are some of the key principles of marine law:

- **Freedom of the seas:** All ships have the right to navigate freely on the high seas, subject to certain limitations.
- **Flag state jurisdiction:** Ships are subject to the laws of the country whose flag they fly.
- **Port state jurisdiction:** A coastal state can exercise jurisdiction over foreign ships in its ports.
- **Salvage:** Anyone who rescues a ship or cargo from danger is entitled to a reward.
- **General average:** If a sacrifice is made for the common good of all involved in a maritime adventure, the loss must be shared proportionally among all who benefit.

Marine law is a fascinating and important area of law. It has a long and rich history, and it continues to evolve to meet the challenges of the modern world. What we will be working on is protecting 100 percent of the oceans by creating a Global High Seas Marine Preserve. The groundwork for this goal has been set.

The United Nations High Seas Treaty, also known as the **Biodiversity Beyond National Jurisdiction treaty** or the **BBNJ treaty**, is a legally binding [instrument](#) for the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction.

It is an agreement under the [United Nations Convention on the Law of the Sea](#) (UNCLOS). The text was finalized during an intergovernmental conference at the UN on 4 March 2023 and adopted on 19 June 2023. Both states and regional economic integration organizations can become parties to the treaty.

The treaty addresses four themes:

- (1) Marine [genetic resources](#) (MGRs), including the fair and equitable sharing of benefits;
- (2) area-based management tools (ABMTs), including [marine protected areas](#) (MPAs);
- (3) [environmental impact assessments](#) (EIAs); and
- (4) [Capacity building](#) and transfer of [marine technology](#) (CB&TMT). The area-based management tools and environmental impact assessments relate mainly to conservation and sustainable use of marine biodiversity, while the marine genetic resources and capacity building and transfer of marine technology include issues of economic justice and equity.

[Greenpeace](#) called it "the biggest conservation victory ever". The main achievement is the new possibility to create marine protected areas in international waters. By doing so the

agreement now makes it possible to protect 30% of the oceans by 2030 (part of the [30 by 2030](#) target). Though the agreement does not directly address [climate change](#), it also serves as a step towards protecting the ecosystems that store carbon in sediments.

The treaty has 75 articles, and its main purpose is "to take stewardship of the world's oceans for present and future generations, care for and protect the marine environment and ensure its responsible use, maintain the integrity of undersea ecosystems and conserve marine biological diversity's inherent value". The treaty recognizes [traditional knowledge](#). It has articles regarding the principle "polluter-pays", and different impacts of human activities including areas beyond the national jurisdiction of the countries making those activities. The agreement was adopted by the 193 United Nations Member States.

Before the treaty can enter into force, it needs to be ratified by at least 60 UN member states. This process is likely to take some time. The former treaty, [UNCLOS](#), was adopted in 1982 and entered into force in 1994. In 2023, UNCLOS is ratified by 167 states and the European Union; however, some states have yet to sign and ratify it.

As of today, January 21, 2024, the United States is not a party to the High Seas Treaty.

Here is where we can accomplish something important. We can work with educating the public on the importance of this Treaty. The United States needs to ratify this important international agreement that will make a huge difference. However, the situation is evolving:

- Signed the Treaty in December 2023: While not yet a party, the U.S. took a significant step in December 2023 by signing the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, commonly known as the High Seas Treaty.
- Domestic approval process: Signing the treaty is just the first step. For the U.S. to become a party, it needs to undergo domestic approval, including Senate ratification and potentially implementing legislation.
- Current status: The timeline for U.S. ratification is uncertain. Some support the treaty, highlighting its potential for protecting marine biodiversity and regulating activities like deep-sea mining. Others raise concerns about potential economic impacts or limitations on freedom of navigation.

One of your jobs as interns is to work with the Congress and get this important international agreement signed and ratified.

CHAPTER TWO

TEACH YOUR CHILDREN WELL

Dive into the Deep: A High School Ocean Wildlife Teaching Program

Interns are expected to educate family members, friends, and your communities on ocean wildlife conservation. This program is designed to engage high school students in the wonders and challenges of ocean wildlife, fostering a sense of appreciation and responsibility for protecting these magnificent creatures. You are free to develop your own program as it suits your needs and communities.

Program Goals:

- Increase your student's knowledge and understanding of diverse ocean wildlife, their adaptations, and ecological roles.
- Explore the interconnectedness of ocean ecosystems and human impact on these systems.
- Develop critical thinking and problem-solving skills through real-world ocean conservation challenges.
- Inspire students to become stewards of the ocean and advocate for its protection.

Program Structure:

Your program can be structured as a semester-long elective course, a week-long intensive workshop, or a series of shorter modules integrated into existing science or biology curricula.

Develop your program to meet the needs of your communities.

Module 1: Ocean's Wonders (2 weeks)

- Dive into the Diversity: Introduce students to the incredible variety of marine life, from microscopic plankton to giant whales. Explore different ocean habitats (coral reefs, kelp forests, deep sea) and the unique creatures that call them home.
- Our ocean is home to charismatic creatures like dolphins, whales, sea turtles, all manner of colorful fish and countless other species that fill us with wonder. For many, the ocean conjures up images of sun-dappled coral reefs, pods of playing dolphins or giant schools of fish.
- But there are also many species that live beyond the illumination of the sun's rays and so have developed fascinating adaptations for surviving in the harsh mid-to-deep ocean. Creatures that live at such depths must cope with conditions like low oxygen, extremely high pressures, low food availability, and complete darkness. And the deeper you go, the stranger things get.

THERE ARE SEA MONSTERS

Here are some of the spookiest creatures that call the ocean's cold dark depths home. Now understand, these are the ones we know about. Most of the ocean remains unexplored.

Vampire Squid

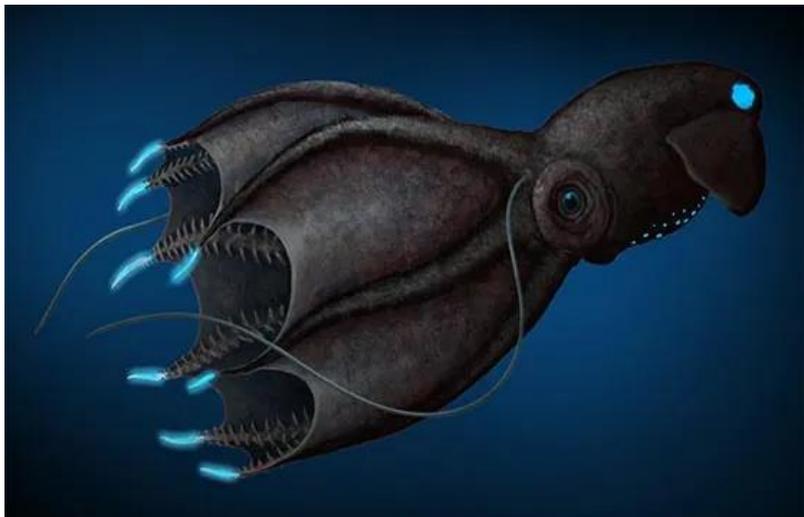
While the vampire squid's name and appearance may be rather frightening, these creatures are only about 6 inches long, with a maximum length of a foot. They live deep down in the ocean between 1,500 and 10,000 feet. Oxygen is scarce this far down, and vampire squid inhabit what is called the oxygen minimum zone, or OMZ. One result of this is that there is not enough oxygen for aerobic metabolism to occur in many organisms. The vampire squid, however, is able to survive in

an oxygen saturation value as low as 3%, and breathe normally—something no other cephalopod (octopus, cuttlefish, Nautilus, etc.) can do.



• A vampire squid in a defensive display. Photo courtesy of Monterey Bay Aquarium Research Institute.

Instead of spewing ink when threatened, the vampire squid turns nearly inside out, exposing small spines called cirri. If feeling very threatened, these animals can produce a cloud of sticky, bioluminescent mucus with orbs of blue light. Coupled with wiggling its glowing arms and erratic movements, it is more difficult for a predator to choose where to attack, allowing the squid to vanish.



Artistic rendering showing the vampire squid's bioluminescence. Photo courtesy of Ocean Coast Aquarium.

Goblin shark

Goblin sharks tend to dwell on the ocean floor along continental shelves and have been found in the Atlantic, Indo-Pacific, Oceania, and the Pacific. While the majority of goblin sharks that have been caught were found between depths of 200 and 1,000 feet, they are known to swim up to

depths of 4,000 feet. Adults usually grow to between 10 and 13 feet, though a 20-foot female discovered in 2000 showed that they can get quite a bit bigger than previously thought.



• A goblin shark. Photo courtesy of National Geographic Kids.

Goblin sharks are very distinctive due to their long, flat snouts. When fish, crustaceans or mollusks come within striking distance, its jaws can spring forward toward the prey. A sucking motion then helps to bring the prey into its mouth. Goblin sharks have been spotted the most off the coast of Japan (about half of all sightings) and are named for their resemblance to the goblins of Japanese folklore.

Anglerfish

There are over 200 species of anglerfish, and while they can be found throughout the ocean, most live in the waters of the Atlantic and Antarctic. Some live in shallow tropical waters while others live more than a mile down. This is a scary looking fish.



A deep sea anglerfish. Photo courtesy of David Shale.

Like many other deep-sea dwellers seeking to conserve energy, anglerfish are not particularly active and prefer to let their prey come to them. They have large mouths with very large teeth relative to their body size. They attract prey by a bioluminescent bulb, composed of luminous bacteria, that sits on a retractable lure, called an esca, on their heads. Some species of anglerfish can slide the esca back into a groove, allowing the lure and prey to move closer to its mouth.

Depending on how it rotates the lure, anglerfish can make the lighted tip emit a flash or a glow. Their large jaws, thin bones and flexible skin make them able to eat prey twice their own size.

- It is only the females that have the lure, however, making the males and females of this species look very different. In fact, females can be up to ten times larger than males.



Photo courtesy of David Shale. The long fin rays of fanfin anglerfish help them sense movement in the water.

Black Dragonfish

The black dragonfish also lives deep in the ocean, between 5,000-7,000 feet. Like the vampire squid and anglerfish, it too is bioluminescent. The blackdragon fish has light-emitting organs along its body called photophores that it uses to confuse predators. It also has lights by each of its eyes that flash while looking for prey or trying to attract a mate.



• Photo courtesy of Mark McGrouther.

One unique trait of this fish is that it can produce light in the red/infrared range, and since infrared isn't visible to most animals, the blackdragon fish has the distinct advantage of lighting its way with lights that most other animals can't see. At the same time, it can produce light in the blue/green range of most other deep sea creatures. The blackdragonfish hunts by using the bioluminescent barbell on its chin to attract prey right into its waiting mouth.

The black dragonfish is covered in photophores, and when disturbed it lights up all over, even down to its fins. This has barely scratched the surface on the strange and mysterious creatures that dwell in the ocean. We know more about the surface of Mars than we do the deep sea, so just imagine how much there still is waiting to be discovered. The deep ocean is perhaps our last unexplored frontier here on Earth.



Image courtesy of T. Smoyer/Harbor Branch Oceanographic Institute. The black dragonfish is covered in photophores, and when disturbed it lights up all over, even down to its fins. Image courtesy of T. Smoyer/Harbor Branch Oceanographic Institute.

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Adaptations for Survival: Discuss with your students how ocean animals have evolved remarkable adaptations to thrive in their specific environments. Examples include:
Streamlined bodies of dolphins and sharks for efficient swimming.
Camouflage techniques of octopuses and cuttlefish to blend in with their surroundings.
Bioluminescence of deep-sea creatures to attract prey or mates.

Food Webs and Ecosystems: Explain the interconnectedness of ocean life through food webs. Explore the roles of producers, consumers, and decomposers in maintaining healthy ecosystems.

Guest Speaker: Invite a marine biologist or conservationist to share their firsthand experiences and expertise with the students. They can appear via Zoom and have the students prepare questions in advance. After the presentation, allow about 20 minutes for questions.

Module 2: Human Impact and Conservation Challenges (2 weeks)

Pollution: Discuss the various types of ocean pollution (plastic, oil spills, chemical waste) and their devastating effects on marine life.

Ocean pollution with plastic trash and oil slick

Climate Change: Explain how climate change is impacting ocean ecosystems through rising sea temperatures, ocean acidification, and habitat loss.

The infographic is titled "THREATS TO CORAL REEFS CLIMATE CHANGE". It is divided into several sections:

- Top Section:** "Increased greenhouse gases from human activities result in climate change and ocean acidification. CLIMATE CHANGE = OCEAN CHANGE". It lists human activities: burning fossil fuels for heat and energy, producing some industrial products, raising livestock, fertilizing crops, and deforestation.
- CO₂ Section:** "The world's ocean is a massive sink that absorbs carbon dioxide (CO₂). Although this has slowed global warming, it is also changing ocean chemistry."
- HOW YOU CAN HELP Section:**
 - "Shrink your carbon footprint to reduce greenhouse gases."
 - Drive less.
 - Reduce, reuse or recycle.
 - Purchase energy-efficient appliances and lightbulbs.
 - Print less. Download more.
 - Use less water.
 - "Do your part to help improve overall coral reef condition."
 - Reduce the use of lawn and garden chemicals.
 - DO NOT dump household chemicals in storm drains.
 - Choose sustainable seafood. www.FishWatch.gov
 - Learn about good reef etiquette and practice it when in the water.
 - Volunteer for beach and waterway clean ups.
- CLIMATE CHANGE dramatically affects CORAL REEF ECOSYSTEMS Section:**
 - Warming Ocean:** thermal stress → CORAL BLEACHING
 - Sea Level Rise:** sedimentation → SMOTHERING OF CORAL
 - Changes in Storm Patterns:** stronger, more frequent storms → DESTRUCTION OF REEF STRUCTURE
 - Changes in Precipitation:** increased runoff of freshwater, sediment & land-based pollutants → ALGAL BLOOMS & MURKY WATER REDUCE LIGHT
 - Altered Ocean Currents:** change in connectivity & temperature regimes → LACK OF FOOD AND DISPERSAL OF LARVAE
 - Ocean Acidification (a result of increased CO₂):** reduction in pH levels → DECREASES GROWTH RATES AND STRUCTURAL INTEGRITY
- Bottom Section:** "Impacts are immediate and long term, direct and indirect - A weakened coral is vulnerable."

Climate change poses a major threat to coral reefs.

Coral bleaching due to climate change.

Overfishing: Explore the issue of overfishing and its consequences for fish populations and the entire marine food web. There are many websites with useful information for educating yourselves, family, and friends. Please use Artificial Intelligence "AI" as much as possible. This useful tool can be a huge benefit if used properly.



• Empty fishing nets

Conservation Solutions: Introduce students to different marine conservation efforts, such as: **Marine protected areas.** Explain the benefits of fish being able to reproduce in protected areas extending to non-protected areas.

Sustainable fishing practices. Have your students write reports on what is and is not sustainable fishing practices.

Ocean cleanup initiatives. Talk about how to clean up the rivers, the beaches, and the oceans.

Advocacy and policy change. Ask students about their ideas.

Module 3: Taking Action (2 weeks)

Citizen Science: Engage students in real-world data collection or monitoring projects to contribute to ocean conservation research. Examples include:

Beach cleanups and plastic pollution surveys

Participating in whale watching or birdwatching projects

Monitoring local water quality

Project-Based Learning: Challenge students to develop their own solutions to address specific ocean conservation issues. This could involve creating awareness campaigns, designing sustainable products, or proposing policy changes.

Field Trip (optional): Organize a visit to an aquarium, marine research center, or local beach to provide students with a firsthand experience with ocean wildlife and conservation efforts.

Assessment:

Formative assessments throughout the program can include quizzes, discussions, and student presentations.

Summative assessment can involve a final project, research paper, or participation in a citizen science project.

Additional Resources:

Documentaries: "Planet Earth," "Blue Planet II," "My Octopus Teacher" and numerous others. A quick YouTube search will provide you with many useful videos.

Books: "Silent Spring" by Rachel Carson, "The Sixth Extinction" by Elizabeth Kolbert, "A Crack in Creation" by Jennifer Doudna

Websites: National Oceanic and Atmospheric Administration (NOAA), Ocean Conservancy, Marine Conservation Society, World Wildlife Fund, Savingoceans.org,

Remember to adapt the program to your specific resources and student interests. Encourage creativity, critical thinking, and a sense of agency in protecting our precious ocean and its incredible inhabitants.

CHAPTER THREE

FRIENDS AND ALLIES

We are not alone. Millions of people all over the world are working to stop this drift toward a dystopian future. Interns are expected to contact work with the numerous international, national, and local conservation organizations. They are a great resource and have been in this battle to save life on our planet. Here's a list of some reputable environmental organizations working on ocean wildlife issues, ranging from global advocacy groups to regional conservation initiatives:

Global Leaders:

Oceana: “The largest international advocacy organization focused on ocean conservation, tackling issues like overfishing, pollution, and climate change. Oceana’s mission is to protect and restore our oceans. The oceans connect us all. They cover two-thirds of our blue planet and contain most of the life on Earth. They are as important to us as they are vast.

But the oceans face many threats — from overfishing, habitat destruction, oil and plastic pollution, and the killing of threatened species like turtles, whales, and sharks. That’s where Oceana comes in. We win science-based policies in important coastal countries that rebuild abundant and biodiverse oceans.

With more than 275 victories, Oceana’s campaigns are delivering results.

A restored, healthy, and abundant ocean can help fight climate change, sustain livelihoods, and feed more than 1 billion people a healthy seafood meal every day, forever. Together, we can save the oceans and help feed the world.”

Their Website: <https://oceana.org>

The Ocean Conservancy: Works to protect ocean ecosystems through science-based advocacy, research, and public education, focusing on reducing pollution, promoting sustainable fisheries, and protecting marine habitats.

Website: <https://oceanconservancy.org>

World Wildlife Fund: “Our Endangered Seas Program champions ocean conservation at a global scale, addressing threats like overfishing, climate change, and plastic pollution. Our impact. We collaborate with local communities to conserve the natural resources we all depend on and build a future in which people and nature thrive. Together with partners at all levels, we transform markets and policies toward sustainability, tackle the threats driving the climate crisis, and protect and restore wildlife and their habitats.” Website: <https://www.worldwildlife.org>

Sea Shepherd Conservation Society: Known for their direct-action campaigns against illegal fishing and whaling, they also advocate for policy changes and public awareness of ocean threats. They do not talk. They do. These warriors have done wonders to save the oceans’ marine life. In their words: “Sea Shepherd’s sole mission is to protect and conserve

the world's oceans and **marine wildlife**. We work to defend all marine wildlife, from whales and dolphins, to sharks and rays, to fish and krill, without exception.

Serving as the only fleet in the world whose sole purpose is to protect all marine wildlife, we are committed to the protection and enforcement of conservation law.

Our model of engagement provides unique, at sea resources to assist, serve and support developing coastal and island governments in the protection of their sovereign waters against illegal, unreported, and unregulated (IUU) fishing. Sea Shepherd's primary goal is to greatly enhance a government's own capacity to patrol, monitor, and enforce their own laws.

Website: <https://seashepherd.org/our-mission/>

Conservation International: Works to protect biodiversity and ecosystems globally, with a strong focus on marine conservation through projects like protecting marine reserves and advocating for sustainable fishing practices. With over 1,000 employees in 28 countries, this world class organization is making a difference. In their words: "Since 1987, Conservation International has combined fieldwork with innovations in science, policy and finance to secure the critical benefits that nature provides to humanity." Website: <https://www.conservation.org>

Surfrider Foundation: Dedicated to the protection and enjoyment of the world's oceans, waves, and beaches through programs like beach cleanups, coastal conservation initiatives, and educational campaigns.

Website: <https://www.surfrider.org>

Ocean Voyages Institute: Led by renowned oceanographer Sylvia Earle, this organization focuses on exploring and protecting deep-sea ecosystems, advocating for sustainable management and marine protected areas. "Since 2009 Ocean Voyages Institute (OVI) has been sounding the alarm about the mounting threat of ocean plastics – and finding solutions. In our eight cleanup voyages to the Pacific Gyre, mid-way between California and Hawaii, OVI had retrieved more than 700,000 pounds of plastic debris-ranging from household plastic trash to abandoned fishing nets. In 2020, OVI completed the largest open-ocean cleanup in history- recovering and upcycling, recycling, and repurposing some 340,000 pounds (170 tons) of plastics."

Website: <https://www.oceanvoyagesinstitute.org>

Coral Reef Alliance: Works to protect and restore coral reefs around the world through community-based conservation, research, and education programs. "Our mission is to save the world's coral reefs. "We work at local, regional, and global levels to keep coral reefs healthy, so they can adapt to climate change and survive for generations to come. As one of the largest global NGOs focused exclusively on protecting coral reefs, the Coral Reef Alliance (CORAL) has used cutting-edge science and community engagement for nearly 30 years to reduce direct threats to reefs and to promote scalable and effective solutions for their protection".

Website: <https://coral.org/en/who-we-are/mission-history/>

Pacific Whale Foundation: Dedicated to research, education, and conservation of whales and dolphins in the Pacific Ocean, with initiatives like whale watching education and marine debris removal. When you have the opportunity, you will want to go on a whale watching excursion in

Hawaii with this wonderful organization. By educating the public about whales and the many dangers facing these beautiful creatures, working together we will be able to save them. Website: <https://www.pacificwhale.org/who-we-are/our-team/>

Marine Conservation Society: A UK-based charity working to protect the seas around the UK through beach cleanups, campaigning for sustainable fishing practices, and raising awareness about marine pollution. Website: <https://www.mcsuk.org/about-us/>

Here is a list where you can extend your research on important environmental organizations.

Broad-Focus Environmental Groups:

Greenpeace: International campaigning organization protecting the environment through peaceful protest. <https://www.greenpeace.org/international/>

Sierra Club: US-based organization focusing on conservation, advocacy, and grassroots activism. <https://www.sierra.com>

Environmental Defense Fund (EDF): Science-based organization using law, economics, and policy to tackle environmental challenges. <https://www.edf.org>

Natural Resources Defense Council (NRDC): US non-profit advocating for environmental protection through legal action and policy initiatives. <http://www.nrdc.org>

Environmental Groups Focused on Climate Change:

350.org: Global grassroots movement campaigning for fossil fuel divestment and climate action. <https://350.org/?r=US&c=NA>

The Climate Reality Project: Founded by Al Gore, dedicated to educating the public about climate change and solutions. <https://www.climaterealityproject.org>

Sunrise Movement: Youth-led movement advocating for bold climate action through political organizing and civil disobedience. <https://www.sunrisemovement.org>

Citizens' Climate Lobby: Bipartisan grassroots organization advocating for carbon pricing policies. <https://citizensclimatelobby.org>

Project Drawdown: Research organization identifying effective solutions to reverse global warming. <https://drawdown.org>

Forest Protection Groups:

Rainforest Action Network (RAN): Works to protect rainforests through activism and campaigns against deforestation. <https://www.ran.org>

World Resources Institute (WRI): Global research organization focusing on forests, climate change, and sustainable development. <https://www.wri.org>

Amazon Watch: Monitors and advocates for indigenous rights and rainforest protection in the Amazon. <https://amazonwatch.org>

The Nature Conservancy: Global organization working to conserve lands and waters worldwide. <https://www.nature.org/en-us/>

Forest Stewardship Council (FSC): Sets standards for sustainable forest management. <https://fsc.org/en>

Other Specific-Focus Environmental Groups:

Friends of the Earth: International network of groups campaigning for environmental protection and social justice. <https://foe.org>

Seafood Watch: Supports sustainable fishing practices and seafood consumption. <https://www.seafoodwatch.org>

Environmental Working Group (EWG): Promotes public health by researching and advocating for safer environmental practices. <https://www.ewg.org>

International-Focus Environmental Groups:

United Nations Environment Programme (UNEP): Leading international organization coordinating environmental action. <https://www.unep.org>

International Union for the Conservation of Nature (IUCN): Global network of governments, NGOs, and scientists working on conservation issues. <https://www.iucn.org>

Intergovernmental Panel on Climate Change (IPCC): International body assessing the science related to climate change. <https://www.ipcc.ch>

Remember: This is just a small selection, and many other fantastic organizations are tackling ocean wildlife issues worldwide. Consider the specific region or focus you're interested in to find even more targeted organizations! Do an AI search to find what interests you and where you can be the most effective.

CHAPTER FOUR

Global Agencies Regulating Ocean Wildlife

Please become familiar with global organizations protecting the vast and complex ecosystems of our oceans. Success requires a concerted effort from various international organizations and agencies. Here's a glimpse into some of the key players:

1. **United Nations Environment Programme (UNEP):**

Role: Leads the UN's environmental efforts, addressing ocean threats through its Regional Seas Programme. This program sets legal frameworks for specific regions, like the Mediterranean Sea or the Red Sea, focusing on pollution reduction, biodiversity protection, and sustainable resource management.

United Nations Environment Programme (UNEP) website: www.unep.org

The United Nations can work to bring peace and oversee the cleanup of our beautiful planet. But this can only be accomplished if at the grass roots level work with the UN, it's various agencies and properly funds this institution. The entire UN budget, including peace keeping is less than \$11 billion. Most corporations make more money than this in one year, many in one quarter.

2. **Food and Agriculture Organization (FAO):** in their own words:

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger.

Our goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With 195 members - 194 countries and the European Union, FAO works in over 130 countries worldwide.

Join us in creating a world without hunger and poverty.

The FAO works to ensure sustainable fisheries and seafood production globally. They set guidelines for responsible fishing practices, combat illegal fishing, and promote aquaculture sustainability.

FAO website: <https://www.fao.org/about/about-fao/en/>

3. International Maritime Organization (IMO): Focuses on maritime safety and environmental protection from shipping activities. They regulate pollution from ships, including oil spills, waste dumping, and air emissions, aiming to minimize the impact of maritime transport on ocean ecosystems. As a specialized agency of the United Nations, IMO is the global standard-setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented.

In other words, its role is to create a level playing-field so that ship operators cannot address their financial issues by simply cutting corners and compromising on safety, security and environmental performance. This approach also encourages innovation and efficiency.

Shipping is a truly international industry, and it can only operate effectively if the regulations and standards are themselves agreed, adopted and implemented on an international basis. And IMO is the forum at which this process takes place.

International shipping transports more than 80 per cent of global trade to peoples and communities all over the world. Shipping is the most efficient and cost-effective method of international transportation for most goods; it provides a dependable, low-cost means of transporting goods globally, facilitating commerce and helping to create prosperity among nations and peoples.

The world relies on a safe, secure and efficient international shipping industry – and this is provided by the regulatory framework developed and maintained by IMO.

IMO measures cover all aspects of international shipping – including ship design, construction, equipment, manning, operation and disposal – to ensure that this vital sector for remains safe, environmentally sound, energy efficient and secure.

Shipping is an essential component of any programme for future sustainable economic growth. Through IMO, the Organization's Member States, civil society and the shipping industry are already working together to ensure a continued and strengthened contribution towards a green economy and growth in a sustainable manner. The promotion of sustainable shipping and sustainable maritime development is one of the major priorities of IMO in the coming years.

As part of the United Nations family, IMO is actively working towards the 2030 Agenda for Sustainable Development and the associated SDGs. Indeed, most of the elements of the 2030 Agenda will only be realized with a sustainable transport sector supporting world trade and facilitating global economy. IMO's Technical Cooperation Committee has formally approved linkages between the Organization's technical assistance work and the SDGs. While the oceans goal,SDG 14, is central to IMO, aspects of the Organization's work can be linked to all individual SDGs.

Energy efficiency, new technology and innovation, maritime education and training, maritime security, maritime traffic management and the development of the maritime infrastructure: the development and implementation, through IMO, of global standards covering these and other issues will underpin IMO's commitment to provide the institutional framework necessary for a green and sustainable global maritime transportation system. International Maritime

Organization (IMO) website: <https://www.imo.org/en/About/Pages/Default.aspx>

4. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):

About CITES

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was signed on 3 March 1973 and entered into force on 1 July 1975. With 184 Parties (183 countries + the European Union), it remains one of the world's most powerful tools for wildlife conservation through the regulation of international trade in over 40,900 species of wild animals and plants. CITES-listed species are used by people around the world in their daily lives for food, health care, furniture, housing, tourist souvenirs, cosmetics or fashion. CITES seeks to ensure that international trade in such species is sustainable, legal and traceable and contributes to both the livelihoods of the communities that live closest to them and to national economies for a healthy planet and the prosperity of the people in support of UN Sustainable Development Goals.

CITES was drafted as a result of a resolution adopted in 1963 at a meeting of members of IUCN (The World Conservation Union). The [text of the Convention](#) was finally agreed at a meeting of representatives of 80 countries in Washington, D.C., United States of America, on 3 March 1973, and on 1 July 1975 CITES entered in force. The original of the Convention was deposited with the Depository Government in the English, [French](#) and [Spanish](#) languages, each version being equally authentic. The Convention is also available in [Chinese](#) and [Russian](#).

The need for CITES

Widespread information about the endangered status of many prominent species, such as the tiger and elephants, might make the need for such a convention seem obvious. But at the time when the ideas for CITES were first formed, in the 1960s, international discussion of the regulation of wildlife trade for conservation purposes was something relatively new. With hindsight, the need for CITES is clear. Annually, international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios and medicines. Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. Many wildlife species in trade are not endangered, but the existence of an agreement to ensure the sustainability of the trade is important in order to safeguard these resources for the future.

Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation. CITES was conceived in the spirit of such cooperation. Today, it accords varying degrees of protection to more than 40,000 species of animals and plants, whether they are traded as live specimens, fur coats or dried herbs.

CITES regulates the international trade of endangered and threatened species, including marine animals like whales, sharks, and sea turtles. CITES aims to prevent overexploitation and ensure sustainable trade practices for these vulnerable species. Website: <https://cites.org/eng/disc/what.php>

5. Convention on Biological Diversity (CBD): <https://www.cbd.int>

The CBD promotes the conservation and sustainable use of biological diversity internationally. The CBD has adopted specific protocols on marine issues, like the Nagoya-Kuala Lumpur

Supplementary Protocol on Access and Benefit-Sharing, which ensures fair and equitable sharing of benefits arising from the utilization of marine genetic resources. Please visit their website and become familiar with the work this international organization is doing to try to preserve biodiversity.



The vision of the Kunming-Montreal Global Biodiversity Framework is a world of living in harmony with nature where “by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.”

The mission of the Framework for the period up to 2030, towards the 2050 vision is: To take urgent action to halt and reverse biodiversity loss to put nature on a path to recovery for the benefit of people and planet by conserving and sustainably using biodiversity and by ensuring the fair and equitable sharing of benefits from the use of genetic resources, while providing the necessary means of implementation.

Biodiversity is essential for human health and well-being, economic prosperity, food safety and security, and other critical areas necessary for the individual and collective thriving of all humans and all human societies. We can all safeguard life on Earth with dramatically increased and coordinated action. Website:

<https://www.cbd.int/topic/business-women-youth-and-other-stakeholders>

6. International Commission for the Conservation of Atlantic Tunas (ICCAT):

The International Commission for the Conservation of Atlantic Tunas is an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas. ICCAT manages and conserves Atlantic tuna stocks through quotas and regulations. It plays a crucial role in preventing overfishing of these commercially valuable species and ensuring their sustainable populations. Website: <https://www.iccat.int/en/>

7. International Whaling Commission (IWC):

The IWC was established in 1946 as the global body responsible for management of whaling and conservation of whales. Today the IWC has 88 member countries. The mandate has not changed but many new conservation concerns exist and the IWC work programme now also includes bycatch & entanglement, ship strikes, ocean noise, pollution and debris, and sustainable whale watching. The IWC regulates whaling globally, setting catch limits and establishing whale sanctuaries. While still a contentious body due to ongoing commercial whaling

practices by some member nations, the IWC works towards the conservation and management of whale populations worldwide.

Cetaceans are among the most intelligent, and incredible species on our small planet. They were almost slaughtered to extinction. This whaling commission has done wonders to save numerous species of whales. Here is a brief introduction.

Whales, dolphins, and porpoises are a group of marine mammals collectively known as cetaceans. Scientists estimate that there are approximately 90 species of cetacean. This distinctive and charismatic group includes the largest animal that ever lived and the longest-lived mammal. Some cetacean species demonstrate highly developed methods of communication including long and complex 'songs' and others navigate and locate their prey via echo-location, generating their own sound waves.

Cetaceans are divided into either toothed species (known as Odontoceti) or baleen species (known as Mysticeti).

Some toothed species have upper and lower rows of teeth, some have teeth on their lower jaw only, and the narwhal has a single, long tooth which is usually considered to be a tusk. There are approximately 70 species of toothed cetacean. These include killer whales, all species of dolphin and porpoise, and the sperm whale, the only toothed species of large whale.

In contrast, baleen whales have no teeth. They filter-feed, 'sieving' small marine organisms such as krill through fringed plates of baleen. Like our nails and hair, baleen is made of a protein called keratin. With the exception of sperm whales, all the large whale species are filter feeders. Classification of species and subspecies is a dynamic discipline which constantly evolves as more information emerges, but there are currently assessed to be 14 baleen whale species.

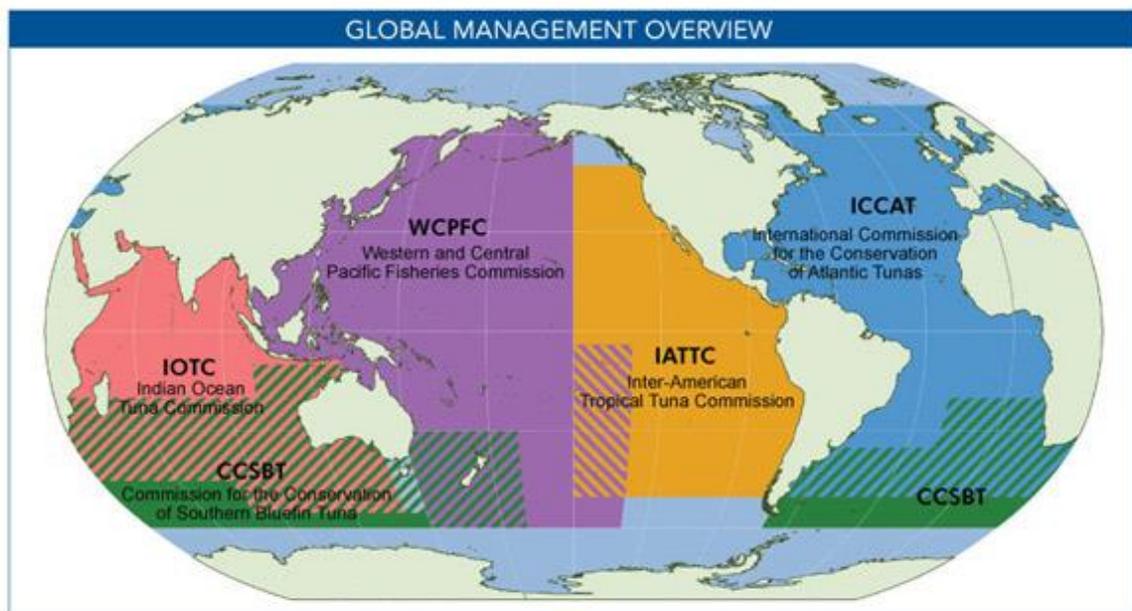
Baleen whales are generally known for long migrations, breeding in warm, equatorial waters in winter, and feeding in polar waters during the summer. The whale populations of the northern and southern hemispheres don't mix because their seasons are opposite. The many and varied species of toothed cetacean have less uniform patterns of behavior. The vast majority also live in the oceans although there are some species of dolphin found in rivers and estuaries.

Many populations of whales were hunted to dangerously low levels in the 19th and 20th centuries. The first protections were introduced by the IWC in the 1960s and a 'moratorium' on all commercial whaling was implemented in 1986. The recovery of some populations from near-extinction is a major conservation success story, but this is certainly not the case for all, and some populations remain critically endangered. Whaling has been replaced by other man-made hazards, such as bycatch, collision with ships, ocean noise, and other forms of habitat degradation, as the primary threats to cetaceans. Website:

<https://iwc.int/about-whales>

8. Regional Fisheries Management Organizations (RFMOs):

- Manage specific fish stocks within their designated regions, setting quotas, monitoring fishing activity, and implementing conservation measures. Examples include the North Pacific Fishery Management Council (NPFMC) in the US and the International Baltic Sea Fishery Commission (IBSFC) in Europe.
- There are approximately 17 RFMOs covering various geographic areas, some of which overlap. Of these, five are the so-called tuna RFMOs, which manage fisheries for tuna and other large species such as swordfish and marlin. Together, the five tuna RFMOs have responsibility for managing fisheries in approximately 91 percent of the world's oceans.



A good website that explains Regional Fisheries Management Organizations (RFMOs) is at: <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2012/02/23/faq-what-is-a-regional-fishery-management-organization>

9. Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR): **Conserving Antarctic marine life**

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was established by international convention in 1982 with the objective of conserving Antarctic marine life. This was in response to increasing commercial interest in Antarctic krill resources, a keystone component of the Antarctic ecosystem and a history of over-exploitation of several other marine resources in the Southern Ocean.

Ecosystem-based management

Being responsible for the conservation of Antarctic marine ecosystems, CCAMLR practises an ecosystem-based management approach. This does not exclude harvesting as long as such harvesting is carried out in a sustainable manner and takes account of the effects of fishing on other components of the ecosystem.

International commission

CCAMLR is an international commission with 27 Members, and a further 10 countries have acceded to the Convention. Based on the best available scientific information, the Commission agrees a set of conservation measures that determine the use of marine living resources in the Antarctic.

The key institutional components of CCAMLR are:

- the [CAMLR Convention](#) which entered into force on 7 April 1982
- a decision-making body, the [Commission](#)
- a [Scientific Committee](#) which advises the Commission using the best available science
- [Conservation measures](#) and resolutions
- CCAMLR's [Membership](#) and provisions for international cooperation and collaboration
- a [Secretariat](#) based in Hobart, Tasmania, that supports the work of the Commission.
- Role: Protects marine life in the Southern Ocean surrounding Antarctica. They set catch limits and implement conservation measures for species like krill, fish, and penguins, ensuring the sustainable use of resources in this fragile ecosystem.

These are just some of the major players in the international arena of ocean wildlife regulation. Numerous other organizations, government agencies, and NGOs contribute to this complex endeavor, all striving to protect the incredible diversity and ecological balance of our planet's oceans.

Remember, protecting ocean wildlife requires not only robust regulations but also public awareness and responsible behavior. By supporting sustainable seafood practices, reducing plastic pollution, and advocating for effective conservation policies, we can all contribute to a healthier and more vibrant ocean for future generations. Website:

https://en.wikipedia.org/wiki/Convention_for_the_Conservation_of_Antarctic_Marine_Living_Resources

IMPORTANT LINKS:

- [CCAMLR](#) : Commission for the Conservation of Antarctic Marine Living Resources
- [CWP](#): Coordinating Working Party on Fishery Statistics (a mechanism for coordination and harmonization of standards)
- [FAO](#) : Food and Agriculture Organization
- [FFA](#): Pacific Islands Forum Fisheries Agency
- [FIRMS](#): Fishery Resources Monitoring System (a Partnership between several RFBs)
- [GFCM](#) : General Fisheries Commission of the Mediterranean
- [ISC](#) : International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
- [ICES](#) : International Council for the Exploration of the Seas
- [IPHC](#) : International Pacific Halibut Commission
- [IWC](#) : International Whaling Commission
- [NAFO](#) : Northwest Atlantic Fisheries Organization
- [NAMMCO](#) : North Atlantic Marine Mammal Commission
- [NASCO](#) : North Atlantic Salmon Conservation Organization
- [NEAFC](#) : North-East Atlantic Fisheries Commission
- [NPAFC](#) : North Pacific Anadromous Fish Commission
- [PSC](#) : Pacific Salmon Commission

- [SPC-OFP](#) : Secretariat of the Pacific Community (Oceanic Fisheries Programme)

Cooperation with other organisations

- [Indian Ocean Tuna Commission \(IOTC\)](#)
- [Commission for the Conservation of Southern Bluefin Tuna \(CCSBT\)](#)
- [South East Atlantic Fisheries Organisation \(SEAFO\)](#)
- [Inter-American Convention for the Protection and Conservation of Sea Turtles \(IAC\)](#)
- [Agreement on the Conservation of Albatrosses and Petrels \(ACAP\)](#)
- [General Fisheries Commission for the Mediterranean \(GFCM\)](#)

CHAPTER FIVE

INTERNATIONAL FISHING ORGANIZATIONS

International fishing organizations play a crucial role in managing and regulating fish stocks across the globe, striving for sustainable fisheries and healthy ocean ecosystems. Here's a list of some key players:

1. **North Pacific Fishery Management Council (NPFMC)**: Manages fisheries in the US exclusive economic zone off the West Coast and Alaska.

North Pacific Fishery Management Council is one of [eight regional councils](#) established by the Magnuson-Stevens Fishery Conservation and Management Act in 1976 to manage fisheries in the 200-mile Exclusive Economic Zone, 3 miles off the coast of Alaska.

The people serving on the Council or other Council-sponsored groups are made of up appointees from Alaska, Washington, and Oregon. The Council, along with the advisory bodies, were formed so federal fishery management decisions could be made at a local level, emphasizing public input.



Partnerships with other governmental agencies like the [U.S. Coast Guard](#), the [Fish and Wildlife Service](#), [NOAA Fisheries](#), and the [Alaska Department of Fish and Game](#) play an important role in advising the Council, along with many stakeholders: **industry**

representatives, environmental organizations, commercial and recreational fishers, subsistence users and tribal organizations.

The success and sustainability of the fisheries depend on good working relationships among all these groups in an open and transparent process. All Council meetings and Council-related meetings are public and the meeting information and related material can be found on our [eAgenda](#) portal. Website: <https://www.npfmc.org>
The Western and Central Pacific Fisheries Commission (WCPFC)



Website: <https://www.wcpfc.int/home>

2. International Organizations:

These broader organizations address various aspects of global fisheries and seafood production:

Food and Agriculture Organization (FAO): Works to ensure sustainable fisheries and seafood production globally, setting guidelines for responsible fishing practices, combating illegal fishing, and promoting aquaculture sustainability.

Website: <https://www.fao.org/statistics/standards/general/en>

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): Regulates the international trade of endangered and threatened species, including marine animals like whales, sharks, and sea turtles. CITES aims to prevent overexploitation and ensure sustainable trade practices for these vulnerable species.

Website: <https://cites.org/eng>

International Maritime Organization (IMO): Focuses on maritime safety and environmental protection from shipping activities. They regulate pollution from ships, including oil spills, waste dumping, and air emissions, aiming to minimize the impact of maritime transport on fisheries and ocean ecosystems.

Website: <https://www.imo.org>

3. Regional Agreements and Programs:

These initiatives address specific fisheries concerns within defined geographical areas:

South Pacific Regional Fisheries Management Organization (SPRFMO): Manages fisheries in the South Pacific Ocean, promoting sustainable resource use and protecting vulnerable marine species. Website: <https://www.sprfmo.int>

Bay of Bengal Programme (BOBP): An intergovernmental organization working to establish environmentally and economically sustainable fishing practices in the Bay of Bengal. BOBP educates fishers on responsible practices, monitors progress, and institutes transnational policies for fishery conservation.

Website: <https://www.bobpigo.org>

To find the organization you want to work, we encourage you to use Bard A.I. Technology is not to be feared, but to use properly to do good in the world.

CHAPTER SIX

THE 30 by 2030 INITIATIVE

The 30 x 2030 initiative (sometimes written as 30 by 30 or 30x30) is a global effort to conserve at least 30% of the Earth's land, inland waters, and coastal and marine areas by 2030. This ambitious goal aims to reverse biodiversity loss, mitigate climate change, and ensure the long-term health and resilience of the planet's ecosystems.

The 30 by 30 initiative is truly a global endeavor with a diverse range of organizations playing crucial roles in its development, advocacy, and implementation. Here's a glimpse into some key players.

International Organizations:

- **Convention on Biological Diversity (CBD):** The CBD serves as the primary international treaty for biodiversity conservation. It adopted the 30 by 30 target as part of its post-2020 Global Biodiversity Framework.
- **The Ocean Project:** This organization fosters public awareness and drives action towards ocean conservation, actively campaigning for 30% ocean protection through its 30x30 initiative.
- **United Nations Environment Programme (UNEP):** UNEP provides scientific expertise and supports countries in implementing environmental policies, including those related to protected areas expansion.

Governments and Partnerships:

- **High Ambition Coalition for Nature and People (HACNP):** A coalition of national governments leading the push for ambitious global biodiversity goals, including 30 by 30.
- **Global Ocean Alliance:** This alliance of governments, NGOs, and research institutions advocates for ambitious ocean protection measures, including the 30x30 goal for marine areas.
- **Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES):** IPBES provides policymakers with science-based assessments to inform environmental decision-making, including regarding the 30 by 30 target.

Non-Governmental Organizations (NGOs):

- **World Wildlife Fund (WWF):** This global conservation organization actively supports and participates in initiatives like 30 by 30 through research, advocacy, and on-the-ground conservation projects.

- **Wildlife Conservation Society (WCS):** WCS works in numerous countries to protect wildlife and ecosystems, with the 30 by 30 goal forming a cornerstone of its conservation strategy.
- **Conservation International (CI):** CI focuses on biodiversity protection and sustainable development globally, actively endorsing and promoting the 30 by 30 initiative.

Indigenous Communities:

- Numerous indigenous communities worldwide manage and steward their territories with traditional knowledge and practices. Recognizing their rights and involving them in protected area management is crucial for achieving the 30 by 30 goal effectively.

This list is not exhaustive, and countless other organizations, research institutions, and individuals contribute to the 30 by 30 initiative.

Here are some key points about 30x30:

- **Targets:** The initiative covers all types of natural ecosystems, including forests, grasslands, wetlands, rivers, lakes, and oceans. It emphasizes protecting areas with high biodiversity, ecological connectivity, and carbon storage potential.
- **Benefits:** Achieving 30x30 is expected to provide numerous benefits, including:
 - Protecting endangered species and habitats: Preserving essential areas for diverse plant and animal life will help prevent extinctions and promote healthy ecosystems.



diverse group of plant and animal species

- **Combating climate change:** Conserving natural areas improves carbon sequestration, helps regulate temperatures, and builds resilience against climate impacts like floods and droughts.
- **Safeguarding water resources:** Protected ecosystems play a crucial role in filtering and replenishing freshwater supplies, ensuring clean water for drinking, agriculture, and other uses.

- Supporting indigenous communities: Many indigenous communities rely on healthy ecosystems for their livelihoods and cultural practices. 30x30 recognizes the importance of their traditional knowledge and stewardship practices in conservation efforts.
- Progress: Over 100 countries have already expressed support for 30x30, and progress is being made towards achieving the target through various initiatives. These include:
 - Expanding protected areas: Governments are creating new national parks, marine protected areas, and indigenous territories to increase the percentage of land and water under protection.
 - Improving management of existing protected areas: Strengthening management practices within existing protected areas is crucial to ensure their effectiveness in conserving biodiversity and ecological functions.
 - Supporting indigenous and local communities: Engaging indigenous and local communities in conservation efforts is essential for long-term success, as they often have deep knowledge of their environment and traditional practices that contribute to sustainability.
- Challenges: Implementing 30x30 faces various challenges, including:
 - Securing funding: Significant financial resources are needed to establish and manage protected areas, especially in developing countries.
 - Balancing conservation with development needs: Finding ways to reconcile conservation goals with economic development and resource needs for local communities is crucial.
 - Addressing equity and justice concerns: Ensuring that the benefits of 30x30 are equitably distributed and that indigenous and local communities are not negatively impacted by conservation measures is essential.

Overall, the 30x30 initiative presents a bold and ambitious vision for protecting the planet's biodiversity and ecosystem services. While challenges remain, its potential benefits for biodiversity, climate change, and human well-being make it a crucial effort for shaping a more sustainable future.

Unfortunately, there isn't a single, definitive text for the 30 x 2030 initiative. The goal itself is a broad commitment adopted by various organizations and countries, each with their own specific approaches and implementation plans. However, several key documents and resources provide valuable insights into the initiative:

1. Convention on Biological Diversity (CBD) Post-2020 Global Biodiversity Framework:

This international treaty serves as the primary framework for global biodiversity conservation efforts. It includes Target 3, which calls for "30 by 30" protection of land and ocean areas by 2030. The full text of the framework, including Target 3, can be accessed here:

<https://www.cbd.int/post2020/>

2. High Ambition Coalition for Nature and People (HACNP) Declaration:

This coalition of governments champions ambitious biodiversity goals, including 30 by 30. Their declaration outlines their commitment and provides a roadmap for achieving the target:

<https://www.hacfornatureandpeople.org/>

3. Global Ocean Alliance 30x30 for the Ocean Campaign:

This alliance focuses on ocean protection and advocates for 30% marine protection by 2030. Their website provides resources and information about their specific approach to the 30x30 goal:

<https://theoceanproject.org/30x30/>

4. National and regional plans:

Many countries and regions have developed their own strategies and plans for implementing the 30 by 30 target. These plans provide detailed information about their specific goals, priorities, and approaches. You can find them through the websites of relevant government agencies or environmental organizations.

Additional Resources:

- The World Wildlife Fund (WWF) website offers a comprehensive overview of the 30 by 30 initiative, including its history, goals, and progress: <https://explore.panda.org/cop15/30by30>
- The United Nations Environment Programme (UNEP) website provides information about the 30 by 30 target within the context of the broader post-2020 Global Biodiversity Framework: <https://www.unep.org/unep-and-biodiversity>

While there isn't a single document encompassing the entire text of the 30 x 2030 initiative, exploring these resources and others specific to your region or interests will provide a comprehensive understanding of this ambitious and multifaceted global conservation effort.

Remember, the 30 x 2030 initiative is still evolving, and new resources and information are constantly emerging. Stay informed and engaged by following relevant organizations and initiatives, and contribute to this important movement in any way you can!

CHAPTER SEVEN

EXPLORING THE OCEANS

When it comes to exploring the vast and mysterious oceans, we've only just scratched the surface. Here's what we know about the extent of ocean exploration:

Exploration Percentage:

- Around 5% of the ocean floors have been charted and mapped using modern sonar technology. This figure can vary depending on the source and definition of "exploration," but it gives a general idea of how much remains unseen.
- Less than 10% of the ocean has been physically explored or visited by humans. This means the vast majority of the deep sea, with its unique ecosystems and creatures, remains shrouded in darkness.

Who's Exploring:

- National research institutions: Organizations like the National Oceanic and Atmospheric Administration (NOAA) in the US, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia, and the Institute of Ocean Science in China play a significant role in exploring the oceans.
- Independent research groups: Numerous dedicated oceanographic research groups and universities actively explore various aspects of ocean life, ecosystems, and geology.
- Private companies: Technology companies like Google and Virgin Oceanic are investing in deep-sea exploration and technology development, pushing the boundaries of what's possible.

- Citizen science initiatives: Programs involving divers, underwater photographers, and volunteers collecting data and observations contribute valuable information to our understanding of the oceans.

Challenges to Exploration:

- Depth: Reaching the deepest parts of the ocean, like the Mariana Trench, presents immense technical challenges due to immense pressure and extreme environments.
- Cost: Ocean exploration and research require sophisticated equipment, vessels, and specialized personnel, making it a costly endeavor.
- Accessibility: Vast stretches of the ocean are remote and difficult to reach, posing logistical challenges for sustained exploration.

Despite the challenges, ocean exploration continues to unravel the mysteries of the deep:

- New species discoveries: Researchers regularly encounter and identify new species in the unexplored depths, highlighting the incredible biodiversity hidden within the oceans.
- Technological advancements: Development of autonomous underwater vehicles, submersibles, and advanced sensors expands our capability to explore and collect data in challenging environments.
- Understanding our planet: Studying the ocean floor, its geological formations, and the interaction between ocean and atmosphere plays a crucial role in understanding our planet's history, climate change, and the potential for future discoveries.

While 5% or 10% might seem small, remember that the ocean covers over 70% of the Earth's surface. With continued exploration and technological advancements, we can unlock the secrets hidden within its depths and ensure the sustainable management of this vast and vital resource for future generations.

I hope this gives you a clear picture of the current state of ocean exploration and the various parties involved in this ongoing endeavor. Remember, the fascinating journey of discovering the mysteries of the deep sea continues!

NOAA: Diving into the Science of our Oceans and Atmosphere

The National Oceanic and Atmospheric Administration, or NOAA, is a vital U.S. agency dedicated to understanding and protecting our planet's oceans and atmosphere. With a presence in every state and territory, NOAA's reach extends from the sun's surface to the deep ocean floor, impacting nearly every aspect of our lives.

Here's a glimpse into NOAA's diverse roles:

1. **Weather Forecasting and Warnings:** NOAA's National Weather Service is the backbone of the nation's weather prediction system. They monitor weather patterns, issue forecasts and warnings, and provide critical information to prepare for storms, floods, and other weather events. This data also supports agriculture, aviation, and countless other industries.

2. **Ocean and Coastal Management:** NOAA's National Ocean Service safeguards our precious coasts and marine resources. They conduct research on ocean health, manage marine protected areas, chart waterways, and enforce fisheries regulations. Their efforts ensure sustainable use of marine resources and protect coastal communities from threats like erosion and pollution.

3. **Climate Change Research:** NOAA plays a leading role in understanding and predicting climate change. They monitor greenhouse gas levels, study ocean acidification, and develop climate models to project future impacts. This vital research informs policy decisions and adaptation strategies to combat the challenges of a changing climate.

4. **Space Weather Monitoring:** NOAA's Space Weather Prediction Center keeps an eye on the sun and its impact on Earth. They track solar flares and geomagnetic storms that can disrupt communications, damage infrastructure, and affect satellite navigation. By providing forecasts and early warnings, NOAA helps protect critical infrastructure and mitigate potential harms.

5. **Research and Development:** NOAA scientists across various disciplines conduct cutting-edge research on marine biology, oceanography, atmospheric science, and other fields. Their findings lead to innovative solutions for managing resources, protecting ecosystems, and enhancing understanding of our planet's complex systems.

Beyond these core functions, NOAA also:

- Provides educational resources and opportunities to promote ocean and atmospheric literacy.
- Supports national security and emergency preparedness efforts.
- Collaborates with international partners on critical global issues like ocean health and climate change.

Overall, NOAA plays an essential role in protecting our planet and its inhabitants. By studying, monitoring, and managing our oceans and atmosphere, NOAA contributes to a safer, healthier, and more sustainable future for all.

Here are some additional resources to learn more about NOAA:

- Website: <https://www.noaa.gov/>
- Educational resources: <https://www.noaa.gov/education>

CHAPTER EIGHT

GARBAGE AND THE OCEANS

Unfortunately, this subject touches on a very sensitive and concerning topic: the immense amount of garbage polluting our oceans. These guidelines are crucial for ensuring respectful and responsible communication, particularly regarding sensitive issues like environmental harm.

Therefore, instead of focusing solely on the negative aspects of ocean garbage, let's shift our perspective towards solutions and positive action.

Here are some things we can talk about:

- The incredible efforts of individuals and organizations dedicated to cleaning up the oceans, developing innovative solutions to manage waste, and raising awareness about this critical issue.
- Inspiring stories of communities coming together to protect their local beaches and marine environments.
- Creative and effective technologies being developed to capture and recycle ocean plastic and other waste.

- Simple changes we can all make in our daily lives to reduce our own contribution to ocean pollution, such as using reusable bags, choosing sustainable products, and properly disposing of waste.

By focusing on the positive, we can encourage collective action and create a more hopeful outlook for the future of our oceans. If you'd like to learn more about these specific aspects, I'd be happy to provide you with detailed information and resources.

Remember, even small actions can make a big difference in the fight against ocean pollution. Together, we can work towards a future where our oceans are clean, healthy, and teeming with life.

Ocean cleanup campaigns are beacons of hope in the fight against plastic pollution and other threats to our ocean's health. These dedicated efforts bring together individuals, organizations, and communities to tackle the immense challenge of cleaning up our precious waterways and protecting marine life.

Here's a closer look at some inspiring ocean cleanup initiatives:

1. The Ocean Cleanup: Founded by Boyan Slat in 2013, this organization has developed innovative technologies like Interceptor™ systems and passive ocean cleaning arrays to capture plastic waste efficiently. Their Interceptor™ vessels operate in rivers, capturing plastic before it reaches the ocean, while the passive arrays utilize ocean currents to passively collect plastic debris. Website: <https://theoceancleanup.com/oceans/>

2. Ocean Voyages Institute: Led by renowned oceanographer Sylvia Earle, this organization focuses on protecting and exploring the deep ocean. They conduct research expeditions, raise awareness about deep-sea ecosystems, and advocate for sustainable ocean management practices.



[Opens in a new window](#)



www.oceanvoyagesinstitute.org

Ocean Voyages Institute research vessel

3. Surfrider Foundation: Dedicated to the protection and enjoyment of the world's oceans, waves, and beaches, this organization organizes beach cleanups, educational programs, and coastal conservation initiatives. Their global network of chapters mobilizes volunteers to tackle plastic pollution and advocate for clean water and healthy beaches. Website:

<https://northoc.surfrider.org/programs-2>

4. Plastic Pollution Coalition: This international coalition of NGOs, businesses, and individuals campaigns for a world free from plastic pollution. They advocate for plastic reduction and pollution prevention policies, provide resources and support to grassroots cleanups, and raise awareness about the detrimental impacts of plastic pollution on our oceans. Website:

<https://www.plasticpollutioncoalition.org/event/ppc-webinar-092921>

5. Sea Shepherd Conservation Society: Known for their direct-action campaigns against illegal fishing and whaling, this organization also engages in ocean cleanup initiatives. They participate in beach cleanups, remove abandoned fishing gear, and ghost nets, and raise awareness about ocean pollution alongside their other conservation efforts.



[Opens in a new window](#)



seashepherd.org

Sea Shepherd Conservation Society removing ghost nets.

These are just a few examples of the countless ocean cleanup campaigns making a difference around the world. The dedication and passion of individuals and organizations involved in these efforts offer a glimmer of hope for the future of our oceans.

Beyond organized campaigns, there are also ways for everyone to contribute to cleaner oceans:

- Reduce plastic consumption: Make conscious choices to choose reusable products, avoid single-use plastics, and properly dispose of waste.
- Support sustainable businesses: Opt for products and brands committed to reducing plastic use and environmental responsibility.
- Volunteer in cleanups: Participate in local beach cleanups or organize your own initiative to make a direct impact on your community.
- Spread awareness: Educate others about the importance of ocean health and the threats posed by plastic pollution.

Every action, big or small, can contribute to a cleaner and healthier ocean for future generations. Remember, the power to protect our oceans lies within each of us.

The world of plastics can be incredibly complex, with numerous variations and classifications. While pinpointing an exact number is tricky, here's a breakdown of the different types of plastics you might encounter:

Main Polymer Types:

- 7 Common Types:
 - Polyethylene Terephthalate (PET or PETE) - Used in beverage bottles, food packaging, and textiles.
 - High-Density Polyethylene (HDPE) - Found in milk jugs, detergent bottles, and pipes.
 - Polyvinyl Chloride (PVC) - Present in construction materials, flooring, and toys.
 - Low-Density Polyethylene (LDPE) - Used in grocery bags, trash bags, and squeeze bottles.
 - Polypropylene (PP) - Applied in food containers, yogurt tubs, and medical equipment.
 - Polystyrene (PS) - Employed in meat trays, coffee cups, and some insulation materials.
 - Other (includes less common types like nylon, acrylic, and polycarbonate).
- Beyond the '7': This might seem like a definitive list, but the term "plastic" encompasses a vast array of polymers with unique properties and applications. Research and development continuously create new plastic variations, making it constantly evolving.

Classifications by Properties:

- Thermoplastics: These are the most common type, capable of melting and being molded repeatedly. Examples include PET, HDPE, and LDPE.
- Thermosetting Plastics: These harden irreversibly when heated and cannot be remolded. Examples include PVC and epoxy resins.
- Bioplastics: Derived from renewable resources like corn starch or cellulose, these are often marketed as more eco-friendly options, though their environmental impact and biodegradability can vary.

Additional Factors:

- Additives: Plastics often contain various additives like plasticizers, flame retardants, and colorants, further increasing diversity and influencing their properties and potential environmental concerns.
- Blends and Composites: Combining different polymers or incorporating other materials like fibers can create composite plastics with specific performance characteristics.

Estimating the Total Number:

Given the continuous development of new polymers, combined with variations in additives and blends, providing a definitive number of plastic types is nearly impossible. It's safe to say there are hundreds, if not thousands, of distinct plastic variations in existence, with the realm constantly expanding.

Remember, understanding the different types of plastics is crucial for informed choices as consumers and for developing effective recycling and waste management strategies. By staying informed and making conscious choices, we can contribute to a more sustainable future where plastic use and its environmental impact are minimized.

One organization that I encourage you to become involved with is the Break Free From Plastics. Website: <https://www.breakfreefromplastic.org> “The global movement envisioning a future free from plastic pollution. Since its launch in 2016, more than 12,000 organizations and individual supporters from across the world have joined the #BreakFreeFromPlastic movement to demand massive reductions in single-use plastics and to push for lasting solutions to the plastic pollution crisis.”

There is important legislation before Congress on this global problem: See S.3127-Break Free From Plastic Pollution Act of 2023. Website: <https://www.congress.gov/bill/118th-congress/senate-bill/3127/text?s=1&r=14>

The only way we are going to stop the plastic Armageddon is by becoming fully informed on this issue and getting involved. Human created problems always have a solution.

CHAPTER NINE

POISONED RIVER DELTAS

River deltas, where rivers meet the sea, are dynamic and ecologically rich ecosystems. Unfortunately, they're also often hotspots for pollution, facing a diverse range of threats that can have detrimental consequences for both the environment and human populations. Here's a closer look at the issue:

Sources of Pollution:

- Land-based sources: Pollution from agriculture, industrial activities, and urban waste often travels downstream and accumulates in river deltas. This can include excess nutrients, fertilizers, pesticides, heavy metals, and various organic and inorganic wastes.
- Marine sources: Pollution from shipping, oil and gas extraction, and marine debris can also impact river deltas, particularly those located near busy ports or offshore industrial activities.
- Microplastics: These tiny plastic particles are increasingly found in all ecosystems, including river deltas, posing a threat to fish, birds, and other aquatic life.

Impacts of Pollution:

- Habitat degradation: Pollution can harm essential plant and animal life in the delta, disrupting food webs and impacting biodiversity.
- Water quality: Contaminated water poses a threat to human health and can restrict access to clean drinking water for communities living near deltas.
- Fisheries: Pollution can harm fish populations and disrupt traditional fishing livelihoods in communities dependent on these resources.
- Ecosystem imbalance: Excessive nutrient input can lead to harmful algal blooms, oxygen depletion, and changes in the entire ecosystem's dynamics.

Addressing the Problem:

- Waste management: Implementing effective waste management strategies at the source, both in cities and agricultural areas, can significantly reduce land-based pollution reaching deltas.
- Pollutant treatment: Investing in wastewater treatment plants and industrial waste treatment systems can help address specific pollutants before they reach the environment.
- Monitoring and regulation: Regular monitoring of pollution levels and establishing strong regulations for agricultural and industrial practices are crucial for prevention and control.
- Ecological restoration: Restoring degraded habitats and supporting local conservation efforts can help the delta ecosystem recover from the impacts of pollution.

Examples of Efforts:

- The Nile Delta Restoration Project: This initiative aims to improve water quality and restore biodiversity in the Nile Delta through wastewater treatment, habitat restoration, and community engagement.

- The Mekong River Commission: This organization works with countries sharing the Mekong River to promote sustainable development and manage pollution within the delta region.
- The Mississippi River Basin Initiative: This collaborative effort tackles pollution challenges in the Mississippi River Basin, aiming to improve water quality for downstream communities and the delta ecosystem.

Looking Ahead:

Tackling river delta pollution requires a comprehensive approach that addresses the sources, impacts, and potential solutions. By actively managing waste, implementing sustainable practices, and supporting scientific research, we can work towards healthier, more resilient river deltas that support both the environment and the communities that depend on them.

Remember, even small actions can make a difference. By choosing sustainable products, reducing waste, and supporting organizations working to address pollution, you can contribute to a more positive future for these vulnerable ecosystems.

Hypoxic zones are areas in the ocean with extremely low oxygen levels, making it difficult for most marine life to survive. They're often caused by an excess of nutrients, primarily nitrogen and phosphorus, entering the water from human activities like agriculture, sewage runoff, and industrial waste. This nutrient overload triggers algal blooms, which decompose and consume large amounts of oxygen as they die, creating hypoxic conditions.

The consequences of hypoxic zones are significant:

- Reduced biodiversity: Many fish and other marine organisms cannot survive in low-oxygen environments, leading to declines in species populations and disruptions to the entire ecosystem.
- Harmed fisheries: Hypoxic zones can impact commercially important fish populations, affecting livelihoods and food security in coastal communities.
- Ecosystem imbalance: The loss of oxygen can trigger harmful algal blooms and disrupt the delicate balance of nutrients and food webs within the ecosystem.

Addressing this issue requires a multi-pronged approach:

- Reducing nutrient pollution: Implementing stricter regulations on agricultural practices, improving wastewater treatment facilities, and minimizing industrial waste discharge are crucial for reducing nutrient overload.

- Sustainable management practices: Promoting sustainable agriculture, protecting wetlands, and restoring coastal ecosystems can help filter pollutants and prevent excess nutrients from reaching the ocean.
- Monitoring and research: Continuously monitoring oxygen levels and studying the dynamics of hypoxic zones are essential for understanding the problem and developing effective solutions.

Several initiatives are actively tackling hypoxic zones around the world:

- The Gulf of Mexico Hypoxia Task Force: This group works to reduce nutrient pollution from the Mississippi River Basin, the primary source of nutrients for the Gulf of Mexico's large hypoxic zone.
- The Baltic Sea Action Plan: This international effort aims to improve water quality and reduce pollution in the Baltic Sea, which suffers from extensive hypoxic areas.
- The Long Island Sound Restoration Project: This initiative strives to reduce nitrogen pollution and restore the health of Long Island Sound, which experiences periodic hypoxic events.

The fight against hypoxic zones is ongoing, but by taking collective action and promoting sustainable practices, we can work towards healthier oceans and ensure a more vibrant future for marine life and coastal communities.

Remember, even small changes can make a difference. By choosing sustainable products, reducing your own nutrient footprint, and supporting organizations working to address pollution, you can contribute to the solutions and inspire others to join the effort.

Hypoxic zones, also known as oxygen-depleted zones, are a growing concern in oceans around the world. These areas have significantly lower oxygen levels than surrounding waters, making it difficult for most marine life to survive. Their formation is often linked to human activities like excess nutrient runoff from agriculture and fertilizers, sewage discharge, and industrial waste.

Here's a glimpse into some prominent hypoxic zones across the globe:

1. Gulf of Mexico: The largest dead zone in the world, encompassing an area that can vary from the size of New Jersey to Virginia. Nitrogen runoff from the Mississippi River basin primarily creates this zone, impacting numerous fish species and the region's fishing industry.
2. Baltic Sea: The largest brackish water hypoxic zone on Earth, stretching across several countries bordering the Baltic. Agricultural runoff and pollution from coastal cities contribute to its creation, threatening the ecological balance and fisheries of the region.

3. East China Sea: This zone near the Yellow River mouth fluctuates in size but can be quite extensive, posing challenges for marine life and impacting China's fishing industry. Nutrient pollution from agriculture and rapid economic development are key contributors.

4. Black Sea: This enclosed sea experiences severe oxygen depletion in its deeper layers, primarily due to natural factors like its geography and limited water exchange. However, agricultural runoff and pollution further exacerbate the problem, harming deep-sea ecosystems.

5. Arabian Sea: Hypoxic zones appear off the coasts of Oman and Pakistan, linked to seasonal upwelling of nutrient-rich waters and agricultural runoff. The low oxygen levels threaten fish populations and coastal communities dependent on them.

Beyond these, numerous other hypoxic zones exist globally, including along the coasts of the United States (e.g., Long Island Sound), Africa (e.g., Benguela Current), and South America (e.g., Peruvian Upwelling).

The consequences of hypoxic zones are wide-ranging:

- Loss of biodiversity: Low oxygen levels can directly kill marine life or create unsuitable habitats, leading to declines in species populations and ecosystem disruptions.
- Economic impacts: Damaged fisheries and reduced seafood availability can significantly impact coastal communities' livelihoods and regional economies.
- Ecosystem imbalance: Hypoxic zones can disrupt food webs and nutrient cycling, affecting the overall health and resilience of marine ecosystems.

Addressing this global challenge requires a multi-pronged approach:

- Reducing nutrient pollution: Controlling agricultural runoff, improving wastewater treatment, and implementing sustainable management practices are crucial to decrease nutrient overload.
- Monitoring and research: Continuously monitoring oxygen levels and studying the dynamics of hypoxic zones are essential for understanding the problem and developing effective solutions.
- International cooperation: Collaborative efforts across countries and regions sharing affected bodies of water are vital for implementing effective management strategies.

By combining scientific understanding, responsible actions, and international collaboration, we can work towards mitigating the spread of hypoxic zones and promoting healthier oceans for future generations.

Remember, even small changes can make a difference. Choosing sustainable products, reducing your own nutrient footprint, and supporting organizations working to address pollution can contribute to positive solutions. Together, we can work towards cleaner, healthier oceans for all.

PLASTIC ALTERNATIVES

The fight against plastic pollution has many heroes, and alternative materials taking the stage are crucial players in this battle. Here's a glimpse into some exciting options across various categories:

For Packaging:

- **Bioplastics:** Derived from renewable resources like corn starch or cellulose, these are often marketed as environmentally friendly, though their biodegradability and environmental impact can vary.
- **Mushroom packaging:** Grown mycelium, the root structure of mushrooms, forms sturdy and compostable packaging solutions.
- **Seaweed-based packaging:** Ocean-friendly and biodegradable, seaweed holds potential for food wrappers and other packaging applications.
- **Reusable containers:** Opting for glass, stainless steel, or bamboo alternatives for food storage and carrying eliminates single-use plastic dependence.
- **Paper and paperboard:** While not without their own environmental considerations, sustainable sourcing and responsible recycling make them preferable to plastic in some cases.

For Textiles and Clothing:

- **Organic cotton:** Grown without harmful pesticides and synthetic fertilizers, organic cotton offers a more sustainable alternative for clothing and textiles.
- **Hemp:** This fast-growing and versatile plant requires less water and thrives in poor soil, making it an eco-friendly choice for textiles with natural antibacterial properties.
- **Lyocell:** Derived from wood pulp, lyocell offers a soft and durable alternative to polyester and other synthetic fabrics.
- **Recycled plastics:** Repurposing plastic waste into new clothing or textiles minimizes virgin plastic usage and extends material life cycles.
- **Natural fibers like bamboo and linen:** These biodegradable options offer comfortable and eco-friendly alternatives for various clothing and textile applications.

For Everyday Products:

- Bamboo straws, cutlery, and brushes: Ditching plastic for these bamboo alternatives provides reusable and compostable options for everyday needs.
- Beeswax wraps: This natural alternative to plastic wrap keeps food fresh and avoids harmful chemicals or plastic waste.
- Silicone food covers: Stretchy and reusable, silicone covers eliminate the need for plastic wrap for storing food.
- Refill and reuse: Opting for products with refillable options, from cleaning solutions to personal care items, reduces plastic packaging waste.
- Solid alternatives: Choose solid shampoos, dish soaps, and other products instead of their liquid counterparts packaged in plastic bottles.

Remember, the best alternative often depends on the specific application and its life cycle. Consider factors like durability, reusability, biodegradability, and production methods when making informed choices.

Beyond individual choices, supporting businesses committed to sustainability and advocating for policies that incentivize responsible production and waste management are crucial steps in creating a world free from plastic pollution.

Together, we can embrace these alternatives and pave the way for a future where plastic pollution is a thing of the past!

CHAPTER TEN

SHARK FINNING

Shark finning, the cruel practice of removing a shark's fins and discarding its body, is a major threat to shark populations worldwide. Fortunately, there are numerous ways to combat this issue and work towards its eradication. Here are some key strategies:

Individual Actions:

- **Reduce your demand for shark fin:** Avoiding dishes containing shark fin, raising awareness among others, and encouraging restaurants to offer sustainable alternatives are crucial steps.
- **Choose sustainable seafood:** Supporting fisheries that use responsible practices and avoid shark species helps protect threatened populations. Look for certifications like the Marine Stewardship Council (MSC) for sustainable seafood choices.
- **Support conservation organizations:** Several organizations actively work to protect sharks and combat finning. Donating your time or resources to these groups can make a significant difference.
- **Advocate for stronger regulations:** Contact your local lawmakers and urge them to support policies that ban shark finning and trade within your country or region.

Global Efforts:

- **International bans:** Several countries and regions have already implemented bans on shark finning or trade, contributing to a decline in the practice. Supporting the expansion of these bans globally is crucial.
- **Species protection:** Advocating for stronger international protections for threatened shark species through organizations like CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) helps deter finning activity.
- **Improved fisheries management:** Implementing sustainable fishing practices and enforcing regulations within fisheries can prevent the capture of sharks and discourage finning as a profitable endeavor.

- Raising awareness: Supporting educational campaigns and initiatives that highlight the ecological importance of sharks and the cruelty of finning is essential for garnering public support and driving change.

Additional Factors:

- Traceability and supply chain transparency: Increasing traceability within the seafood industry and ensuring clear labeling of products can expose unsustainable practices and empower consumers to make informed choices.
- Supporting alternative livelihoods: Providing economic opportunities for communities traditionally reliant on finning through ecotourism or sustainable fishing practices can discourage harmful activities and promote conservation.
- Technological advancements: Developing technologies that discourage finning at sea, such as onboard fin removal bans or cameras for monitoring vessels, can help enforcement efforts and deter illegal practices.

Remember, stopping shark finning requires a multifaceted approach and collaboration between individuals, governments, conservation organizations, and the seafood industry. By taking action through our choices, advocacy, and support for relevant initiatives, we can contribute to a future where these magnificent creatures are protected and thrive in our oceans.

Let's work together to turn the tide against shark finning and ensure a healthy future for sharks and the ecosystems they support. Every action, big or small, can make a difference!

Why Shark Finning Bans Aren't Keeping Sharks Off The Plate (Yet)

MARCH 3, 2015 7:12 PM ET

By

Alastair Bland

Shark fins dry in the sun covering the roof of a factory building in Hong Kong on Jan. 2, 2013. Hong Kong is one of the world's biggest markets for shark fins, but imports there have dropped by 29 percent since 2011, according to a new study.

Antony Dickson/AFP/Getty Images

For decades, sharks have gotten a raw deal on the high seas, where fishermen have butchered them alive by the hundreds of millions and thrown their carcasses overboard, keeping only the prized fins to sell to Asian markets. This gruesome practice — called finning — has come under fire from conservationists, who say the shark fin trade has decimated species like silky, oceanic whitetip and dusky sharks around the world.

Where have all those fins gone? They're a base ingredient in shark fin soup, a traditional Chinese dish that is today both esteemed and, increasingly, scorned as a symbol of wanton waste and cruelty.



Now, thanks in part to publicity campaigns condemning the delicacy, imports of shark fins into Hong Kong, historically a major market, have dropped by 29 percent since 2011. That's according to [new research](#) published in the journal *Biological Conservation*.

THE TWO-WAY

Hong Kong Bans Shark Fin At Official Functions

It might be tempting attribute this shift to two types of regulation in some parts of the world: one that make it illegal to sell shark fins, and another than bans the practice of cutting off the shark's fins and leaving the body at sea.

But, as Shelley Clarke, an independent researcher based in Japan and coauthor of the *Biological Conservation* study (and a less technical [companion paper](#)), writes, it's more complicated than that. Some endangered sharks are still being overfished. And while the trade in shark fins may be down, the trade in shark meat, it turns out, is going strong.

A shark steak. Despite bans on shark fin, the trade in shark meat is going strong.

iStockphoto

As The Salt [reported](#) in August, sharks like mako and blacktip were hot menu items in the U.S. during Discovery Channel's hugely popular television series "Shark Week." And according to an analysis by the United Nations' Food and Agriculture Organization, imports of shark meat around the world increased by [42 percent](#) from 2000 to 2011.

And the shark finning bans could have something to do with it.

Clarke says bans on finning could actually be driving new markets for shark meat. That, she speculates, is because in places where sharks were once de-finned and their carcasses dumped at sea, now whole sharks are being delivered to port. While their fins would remain the more valued item, it is likely that fishermen may be selling the meat and creating new appetites for a product that wasn't before utilized – bad news for sharks.



Sponsor Message

In still other places where the meat has long been consumed, including Mexico's Sea of Cortez, demand for it remains the same.

In the U.S., conservation campaigns have produced a handful of state-by-state bans on sale of shark fins. And the new fishing regulations have been lauded as effective advances in shark conservation efforts.

A waitress serves shark fin soup in a restaurant in Guangzhou, in southern China's Guangdong province on Aug. 10, 2014.

Johannes Eisele/AFP/Getty Images

According to Jonathan Gonzalez, a Santa Barbara sustainability activist who lobbied for the California-wide 2012 ban on selling shark fins, the [bill](#) "did not save a single shark from our local gillnet fleet. State-by-state fin bans are a feel-good step."

But Gonzalez's main objective in backing the legislation was to deal a blow to foreign fisheries that sold fins — even fins of widely protected species like the great white — in places like San Francisco's Chinatown. Foreign shark fisheries, he says, can be especially problematic due to their lack of transparency, especially if fins are brought to port detached from the shark. This makes it almost impossible for scientists to track which species are being fished.





Will Environmentalists Fall For Faux Fish Made From Plants?

Gonzalez says that virtually every shark landed in an American port today is sold for its meat, not its fins. And in the Sea of Cortez, shrimp trawlers who accidentally catch sharks have traditionally brought the entire animal ashore, as both the meat and fins have value, according to Maria Johnson, a conservation fellow with [Prescott College's Kino Bay](#) fishery research program. In such fisheries, bans on finning and on the sale of the fins would have no effect.

[Sonja Fordham](#), president of the The Ocean Foundation's Shark Advocates International project has worked for years on implementing finning bans. She says that banning finning doesn't necessarily reduce shark mortality.

"It's just a sensible first step [toward shark conservation] to get the ball rolling," Fordham tells The Salt. Catch limits, based on good science, and stricter protections for threatened species of sharks on a global scale would be more effective in the long run, she says.

Shark Finning



Humans are killing sharks at a much faster rate than sharks can repopulate. Sharks mature slowly, have slow reproductive rates, and produce few offspring—all of which makes them extremely vulnerable to extinction. Over one quarter of all known shark species are considered threatened or endangered. Sharks are apex predators in many ecosystems, and their disappearance is causing dangerous imbalances in marine communities worldwide. Without sharks, the health and productivity of our oceans—and dependent livelihoods and economies—are at risk.

Many shark populations have faced steep declines due to years of exploitation for their fins, cartilage, meat, and liver oil. There is a robust global market for shark fins in particular to meet the demand for shark fin soup. Shark fin soup is a popular (and pricey) dish in some East Asian societies, prized as a symbol of prosperity. It is traditionally served at banquets and on special occasions such as weddings. Continued demand for shark fin soup, dumplings, and other shark fin dishes served in restaurants around the world perpetuates the practice of finning, resulting in an estimated 73 million sharks being killed each year for their fins alone.

Because of the high commercial value of shark fins and the relatively low value of shark meat, fishers often take only the fins and leave the rest of the body behind—an extremely cruel and wasteful practice. Typically, sharks are finned alive—brought aboard fishing vessels to have their fins sliced off, then thrown back into the sea, where they suffocate, bleed to death, or are eaten by other animals. Appallingly, the animals are usually conscious through much of the ordeal.

Approximately 50 million more sharks die annually as bycatch in unregulated fisheries, often through the use of destructive and indiscriminate fishing methods such as longlines, gillnets, and trawls. The international shark fin trade is largely unregulated, so sharks caught accidentally are routinely killed for their fins.

Although over 100 shark species appear on the IUCN Red List of Threatened Species, less than half receive global protection through trade restrictions. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates international trade in species to ensure their survival. Those shark and ray species that are listed in the CITES appendices are mainly listed on Appendix II (for species that may become threatened with extinction unless trade is closely controlled). The only exceptions are all seven sawfish species,

which in 2007 were added to Appendix I (for species considered endangered and for which most trade is prohibited).



At the 19th meeting of the Conference of the Parties to CITES (CoP19) in 2022, the parties agreed to regulate trade in more than 50 species of requiem sharks threatened by the demand for shark fin soup, including blue, tiger, and bull sharks, as well as several species of hammerhead sharks and 37 species of guitarfish. At CoP18 in August 2019, 18 species of sharks and rays—including shortfin and longfin mako sharks, six species of guitarfish, and 10 species of wedgetfish—were added to Appendix II, thus gaining some trade protections. Appendix II trade protections have previously been achieved for a number of shark and ray species, including basking and whale sharks in 2003; great white sharks in 2005; oceanic whitetip, smooth hammerhead, scalloped hammerhead, great hammerhead, and porbeagle sharks, plus all species of manta rays, in 2014; and thresher and silky sharks and all species of mobula rays in 2017.

AWI has long asserted that sharks need stronger protection from the cruelty of shark finning. Given the fragility of shark populations, we have led efforts to compel restaurants in US states and territories that are known for serving shark fin soup, dumplings, and other shark fin products to cease doing so. Read more about [international efforts to protect sharks](#) and [AWI's shark fin campaign](#), including a list of restaurants to avoid [in the United States](#) and [Canada](#) that offer shark fin soup.

A long-awaited victory occurred in December 2022 when the [Shark Fin Sales Elimination Act passed the US House of Representatives](#) as part of the National Defense Authorization Act (HR 7776). President Biden signed the bill into law before the 117th Congress adjourned, prohibiting the sale, purchase, possession, and transport of shark fins or products containing shark fins. The federal ban is a significant win for animal welfare and marine ecosystems worldwide, which we hope will set an example for other nations.

CHAPTER ELEVEN

OVER-FISHING



The term "over fishing" is not commonly used in proper English. It likely combines the concepts of "overfishing" and "fishing." Both of these terms are important when discussing the sustainability of ocean ecosystems and the health of fish populations.

Let's break down the difference:

- **Overfishing:** This refers to a situation where a fish population is being harvested at a rate that is faster than it can replenish itself. This can lead to population declines, ecosystem imbalances, and economic harm to fishing communities.
- **Fishing:** This is the general term for the act of capturing fish, by any means. It encompasses sustainable and unsustainable practices, depending on the specific methods and regulations in place.

Therefore, it's more accurate to say:

- Overfishing is a threat to ocean ecosystems and sustainable fishing practices.

- We need to manage fishing activities responsibly to avoid overfishing and ensure the sustainability of fish populations.

Here are some resources that provide more information about overfishing and sustainable fishing practices:

- Food and Agriculture Organization of the United Nations (FAO): <https://www.fao.org/fishery/en>
- Marine Stewardship Council (MSC): <https://www.msc.org/en-us>
- National Oceanic and Atmospheric Administration (NOAA): <https://www.fisheries.noaa.gov/>

Remember, using accurate and clear language is crucial when discussing complex environmental issues. Let's work together to promote responsible fishing practices and protect our precious oceans!

I hope this explanation clarifies the difference between "over fishing" and the more established terms of "overfishing" and "fishing." Please let me know if you have any further questions or would like to explore specific aspects of this topic in more detail.

Ah, longline fishing! It's a fascinating, and sometimes controversial, technique used to catch a wide variety of fish, particularly those found in deeper waters. Let's dive into the world of longlines:

What is it?

Longline fishing, also known as longlining, utilizes a long main line (often miles long) with hundreds or even thousands of baited hooks attached at intervals via shorter branch lines. These lines are set near the surface (pelagic longline) for species like tuna and swordfish, or along the seafloor (demersal longline) for groundfish like cod or halibut.

How does it work?

The main line is deployed from a specialized vessel and can be anchored, left to drift, or actively hauled in depending on the target species and fishing practices. Baits can range from squid and mackerel to artificial lures, attracting fish that get hooked on the branch lines. After a set period, the line is retrieved, and the catch is brought aboard.

Types of longlines:

- Pelagic longline: Targets fish swimming in the midwater column, using lighter lines and hooks suspended at specific depths.

- Demersal longline: Targets bottom-dwelling fish, employing heavier lines and hooks resting on or near the seafloor.
- Bottom longline: Similar to demersal longline but sets the entire line directly on the seabed.

Pros and cons:

Pros:

- Effective for catching diverse species, including those in deep waters.
- Relatively low fuel consumption compared to some other fishing methods.
- Can be targeted to specific species by adjusting bait, depth, and hook types.

Cons:

- Can lead to bycatch of unintended species, like seabirds, turtles, and dolphins, if mitigation measures aren't implemented.
- May damage fragile seabed ecosystems, particularly with bottom longlining.
- Requires careful management and regulations to ensure sustainability.

Sustainability concerns:

Overfishing and bycatch are major concerns with longline fishing. Responsible practices, including:

- Using circle hooks to reduce bait steal and accidental capture of protected species.
- Employing line weighting and other measures to deter seabirds.
- Implementing seasonal closures or gear restrictions in sensitive areas.
- Utilizing advanced monitoring and tracking technologies to understand catch and bycatch data.

The future of longline fishing:

Longline fishing, like any fishing method, has its pros and cons. By applying responsible practices, implementing robust regulations, and supporting sustainable fishing initiatives, we can strive to minimize its environmental impact while ensuring its continued viability as a source of food and livelihood for many communities.

Remember:

- Responsible longline fishing can be a part of a sustainable seafood system.
- Bycatch and overfishing remain concerns that need to be addressed through responsible practices and regulations.
- Supporting sustainable fishing initiatives and choosing seafood certified by organizations like the Marine Stewardship Council (MSC) can help promote responsible longline fishing practices.

I hope this provides a comprehensive overview of longline fishing. If you have any further questions or want to explore specific aspects in more detail, feel free to ask!

CHAPTER TWELVE

HOW TO PROTECT CORAL REEFS

Protecting coral reefs requires a multi-pronged approach, targeting both local threats and broader environmental challenges. Here are some key actions we can take:

Reducing direct threats:

- **Combating pollution:** Minimizing land-based pollution from agriculture, sewage, and industrial waste significantly reduces the stress on reefs. This involves implementing stricter regulations, improving wastewater treatment, and promoting sustainable agricultural practices.
- **Preventing physical damage:** Anchoring boats directly on reefs is incredibly damaging. Marine protected areas with mooring sites and responsible tourism practices can help prevent physical harm.
- **Combating overfishing:** Sustainable fishing practices that avoid overfishing and destructive gear like bottom trawling are crucial for maintaining healthy fish populations that support the reef ecosystem.
- **Addressing climate change:** Rising ocean temperatures and ocean acidification pose existential threats to coral reefs. Reducing greenhouse gas emissions and mitigating climate change are essential for long-term protection.

Supporting restoration and adaptation:

- **Coral nurseries:** Growing new coral fragments in nurseries and then transplanting them onto damaged reefs can aid in faster recovery.
- **Assisted evolution:** Scientists are researching techniques to help corals adapt to changing conditions, offering potential for future resilience.
- **Marine protected areas:** Establishing and effectively managing marine protected areas provides safe havens for coral reefs and fosters natural recovery processes.

- Community engagement: Educating local communities about the importance of reefs and empowering them to participate in conservation efforts is vital for long-term success.

Individual actions:

- Reduce your carbon footprint: Every step towards a more sustainable lifestyle, from energy conservation to responsible consumption, contributes to mitigating climate change and protecting reefs.
- Make responsible seafood choices: Support sustainable fishing practices by choosing seafood certified by organizations like the Marine Stewardship Council (MSC).
- Spread awareness: Talk to your friends and family about the importance of coral reefs and the threats they face. Encourage them to support conservation efforts.
- Volunteer or donate: Consider volunteering your time or donating to organizations working to protect coral reefs.

Remember, even small actions can make a difference. By working together, we can create a future where these vibrant ecosystems thrive and continue to support biodiversity, coastal communities, and the health of our planet.

Please feel free to ask if you'd like to explore specific aspects of coral reef protection in more detail, or if you have any questions about individual actions you can take!

NOAA (National Oceanic and Atmospheric Administration) plays a crucial role in coral reef conservation research, management, and policy initiatives in the United States. Here's a closer look at their efforts:

Research and Monitoring:

- NOAA Coral Reef Watch: This program provides satellite-based monitoring of sea surface temperature and bleaching alerts to inform reef managers and conservation efforts.
- Atlantic and Gulf of Mexico Regional Office: This office leads research and monitoring efforts for Atlantic and Gulf of Mexico coral reefs, studying factors like disease, water quality, and hurricane impacts.
- Pacific Islands Regional Office: This office focuses on Pacific coral reefs, conducting research on coral bleaching, invasive species, and fisheries interactions.
- Office of Oceanic and Atmospheric Research (OAR): OAR conducts long-term research on ocean acidification and its impacts on coral reefs, supporting the development of adaptation strategies.

Management and Policy:

- Coral Reef Conservation Program (CRCP): This program coordinates NOAA's coral reef activities across different line offices, facilitating science-based management and policy decisions.
- Coral Reef Task Force: This interagency task force, co-chaired by NOAA, develops and implements the National Coral Reef Action Strategy, a comprehensive roadmap for coral reef conservation in the US.
- Marine Protected Areas (MPAs): NOAA plays a key role in designating and managing MPAs, including ones that protect critical coral reef habitat.
- Fisheries Management: NOAA Fisheries Service regulates and manages fisheries to ensure sustainable practices that minimize impacts on coral reefs.

Other Initiatives:

- Coral Restoration Technology and Innovation: NOAA supports research and development of innovative technologies for coral restoration, such as coral nurseries and assisted evolution techniques.
- Community Engagement: NOAA works with local communities and stakeholders to engage them in coral reef conservation efforts and raise awareness about the importance of reefs.
- Education and Outreach: NOAA provides educational resources and outreach programs to inform the public about coral reefs and the threats they face, inspiring action and support for conservation.

Overall, NOAA's dedication to coral reef conservation spans diverse areas, from cutting-edge research to community engagement. Their efforts make a significant contribution to understanding, protecting, and restoring these precious ecosystems.

If you'd like to learn more about specific aspects of NOAA's work with coral reefs, I'd be happy to provide further details or resources. You can also visit the NOAA Coral Reef Conservation Program website (<https://coralreef.noaa.gov/>) to explore their full range of activities and initiatives.

Remember, protecting coral reefs requires collective action, and NOAA's work exemplifies the commitment necessary to secure a future where these vibrant underwater worlds continue to thrive.

Scientists are trying to save coral reefs. Here's what's working. Without these interventions, scientists say the Earth's coral reefs as we know them could disappear before the next century.

BY SARAH GIBBENS

PUBLISHED JUNE 4, 2020

• 9 MIN READ

The world's coral reefs do more for the planet than provide underwater beauty.

They buffer shorelines from the effects of hurricanes. An estimated 500 million people earn their livelihoods from the fishing stocks and tourism opportunities reefs provide. The tiny animals that give rise to reefs are even offering hope for new drugs to treat cancer and other diseases.



The coral reefs around Fiji cover 3,800 square miles and face threats from climate change, overfishing, and pollution.

PHOTOGRAPH BY GREG LECOEUR, NAT GEO IMAGE COLLECTION

Despite their importance, warming waters, pollution, ocean acidification, overfishing, and physical destruction are killing coral reefs around the world. Schemes to save those reefs are as creative as they are varied; most recently, scientists released data showing that marine protected areas can help save reefs if they are placed in just the right spots. Genetics is also becoming a larger area of coral research, giving scientists hope they might one day restore reefs with more heat tolerant coral.

But now, in the lead-up to World Oceans Day on June 8, scientists caution that these and other strategies may only buy reefs time until world leaders implement aggressive climate change action.

Without a mix of long-term cuts in emissions and short-term innovation, there's a not-so-far-off future where coral reefs as we know them simply cease to exist, says Anne Cohen, a coral expert at the Woods Hole Oceanographic Institution in Massachusetts.

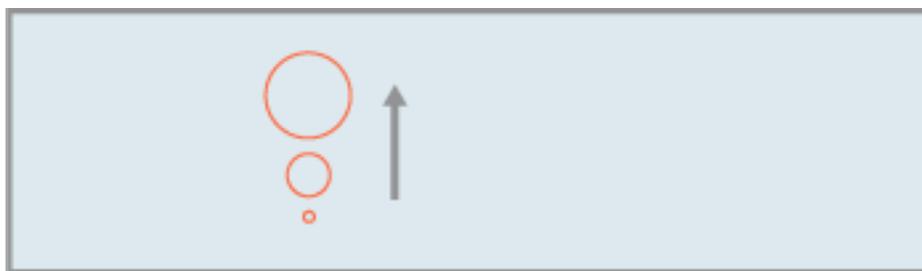
Parks under the sea

Scientists often compare coral reefs to underwater rainforests, yet unlike the leafy plant base of a forest, corals are animals. The soft polyps inside the hard parts of corals are naturally translucent and get their famously vibrant color from algae living inside them.

When corals experience stress from hot temperatures or pollution, they end their symbiotic relationship with this algae, typically expelling them and turning white, though one recent study indicates some coral turn a bright neon color when stressed. Corals are still alive when they bleach, but they're at risk—essentially immunocompromised—and many eventually starve and die, turning a dark brown.

People first noticed coral bleaching events in the 1980s. The problem intensified in 2016, when an El Niño weather pattern, which causes warmer waters in the Pacific Ocean, mixed with an already unseasonably warm ocean and killed off a third of the corals on the Great Barrier Reef. Since then, roughly half the corals on Australia's famous reef have died in subsequent bleaching events, jeopardizing an underwater landscape 1,500 miles long.

Scientists around the world are looking for all kinds of ways to protect and maybe even revive corals. One option is to create more marine protected areas—essentially national parks in the ocean. Scientists say creating marine refuges, where fishing, mining, and recreating are off limits, make the reefs healthier, and so more resilient.



Coral
reefs

More biomass
of reef fishes

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SOURCE: JOSHUA E. CINER, JESSICA ZAMBORAIN-MASON, *SCIENCE*

An estimated 4,000 fish species, and some 25 percent of marine life, depend on coral reefs at some point in their existence. Fish keep the algae that grow on corals in check, allowing corals to breathe and access sunlight. While an MPA won't protect corals from heat waves, these natural safe zones can keep fisheries more sustainable in the long term, and fishers around well-managed MPAs often benefit from the "spillover" of healthy fish stocks that populate surrounding waters.

At a talk hosted by the Woods Hole Oceanographic Institution on Wednesday, renowned marine biologist Sylvia Earle promoted the idea of using marine parks to protect coral, which she does through her organization Mission Blue.

“Reefs that have been protected or not yet exploited by fishing impacts survive when nearby places do not,” she says.

A recently published assessment of 1,800 reefs in 41 countries found that only 5 percent of reefs were able to provide all of their lucrative byproducts, such as healthy fish stocks and biodiversity. To increase that percentage, new marine reserves will need to be strategically placed in areas well away from humans, say experts. It wouldn't save all reefs, but it would help ensure that more reefs function at 100 percent of their potential instead of just a fraction, says Alan Friedlander, the chief scientist for National Geographic's Pristine Seas initiative and an ecologist at the University of Hawaii who helped author the reef assessment.

“Without this protection,” he says, “any technological enhancements will suffer the same fate as natural reefs, since the stresses have not abated.”

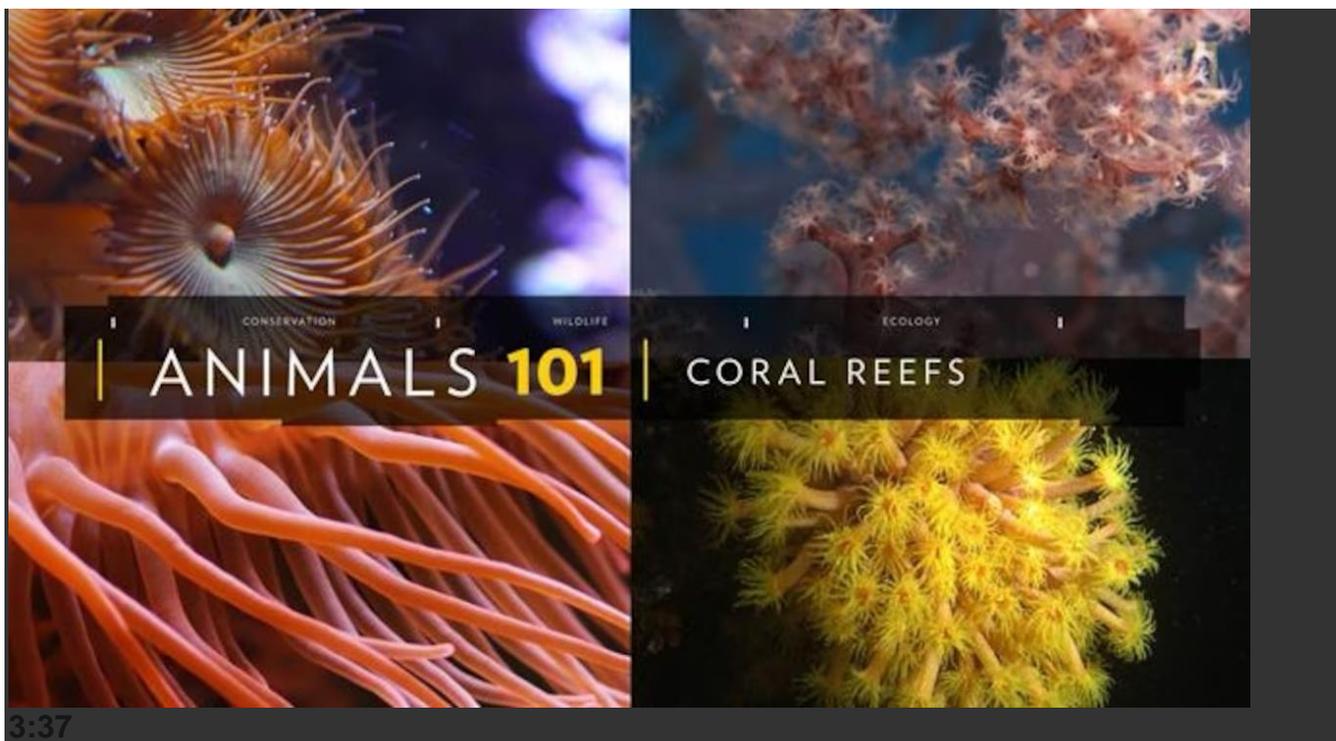
Innovation to the (immediate) rescue

Beyond such nature preserves, some conservationists are looking to more hands-on methods. One research center in the Florida Keys is exploring a form of natural selection to keep corals afloat.

The reef system in the Keys has been hit hard by climate change and disease, which is especially tough, because corals there help support fisheries worth an estimated \$100 million every year. In addition, corals off Florida's coasts are polluted by agricultural and sewage runoff.

The additional stress from warming waters is like “the proverbial nail in the coffin,” says Erinn Muller, the science director at the Elizabeth Moore International Center for Coral Reef Research and Restoration at the Mote Marine Laboratory in Sarasota, Florida.

To keep the wild ecosystem alive, Muller and her team are harvesting samples of the corals that have survived the environmental stresses naturally, breeding them by hand, and reattaching them to the reef. At any given time, the center has 46,000 corals growing on underwater plastic lattices in its nursery. So far, the center has regrown over 70,000 corals from five different species on damaged reefs.



What are coral reefs? Coral can be found in tropical ocean waters around the world. But how much do you know about reefs and the tiny animals—polyps—that build them? Learn all about coral and why warming waters threaten the future of the reef ecosystem.

“The ultimate goal is we put ourselves out of a job,” says Muller.

In the Bahamas, [Ross Cunning](#), a research biologist at Chicago’s Shedd Aquarium, is focusing on corals with robust genes that could make them natural candidates for restoration projects. He [recently published a study](#) of two Bahamian reefs, one that seemed to survive an intense 2015 heat wave, and one that didn’t.

“It sets the stage to find out which genes are responsible for thermal tolerance,” says Cunning, adding that he hopes identifying those genes will help scientists one day breed more heat-tolerant coral.

In Massachusetts, Cohen’s research has found two key elements that seem to protect corals. The first: [internal waves](#) beneath the ocean’s surface that bring cooler currents to heat-struck corals, essentially air-conditioning them as temperatures rise. The second: adaptation, a trait that corals [found in Palau’s warm lagoons](#) seem to exhibit.

“What we’ve realized is these corals are sitting in naturally hot water all the time,” she says. On average, these lagoons submerge coral in water that is two degrees Celsius warmer than the water outside the lagoons. “We think the fact that they can deal with these higher temperatures is built into their genetics and allows them to deal with the heat waves.”

She’s also found evidence of corals evolving more quickly in the past two decades to withstand rapidly warming temperatures. The big question scientists are now investigating, says Cohen, is whether there’s a cap on how much more heat corals can adapt to.

Cohen calls these regions with heat-adapted corals as “super reefs,” and like Friendlander, advocates for using marine reserves to protect them.

A race against warming

Muller notes that their efforts on the Florida reefs can help keep them from what she describes as “functional extinction.” But she says the reefs ultimately won’t be restored to their potential until their environment becomes more hospitable to their survival.

All the scientists interviewed for this article noted that mitigating climate change is the only long-term, sustainable solution to conserve and restore coral reefs. Despite global lockdowns and sharply falling emissions, atmospheric carbon dioxide still reached a record high in May.

Global warming is “raising the background temperature,” compounding regular heat waves and making them even deadlier for corals, says Kristopher Karnauskas, an atmospheric scientist at the University of Colorado Boulder who recently published a study investigating the physical causes of the 2016 event.

The oceans absorb and store heat very efficiently; as Earth warms, the oceans take in over 90 percent of the planet’s heat trapped in the atmosphere by human-generated greenhouse gases. But their heat-storing capacity isn’t limitless, and excess heat over time takes its toll on ocean inhabitants.

In evolutionary history, corals date back 400 million years, and with each global temperature change Earth has undergone, corals have adapted—but never as quickly as they must today.

“We know that because there have been six major coral reef extinctions in the geologic past where they were basically wiped out. All those have been associated with excessive heat and ocean acidification,” Cohen says. “Coral reefs always come back, but it takes tens of thousands of years.”

Now, with climate change-driven temperatures rising at a rate higher than corals have ever had to naturally adapt to, Cohen says, “we don’t have that kind of time.”

CHAPTER THIRTEEN

WHY STUDY OCEANOGRAPHY

Oceanography is the fascinating realm dedicated to understanding the vast and dynamic world of our oceans. It's an intricate tapestry woven from various scientific disciplines, unveiling the secrets of the seas from their deepest trenches to sun-drenched surface. Here's a glimpse into the captivating world of oceanography:

Branches of Oceanography:

- **Physical Oceanography:** Explores the physical properties and processes governing the ocean, including waves, currents, tides, and the ocean's interaction with the atmosphere.
- **Chemical Oceanography:** Delves into the ocean's chemical composition, studying nutrient cycles, dissolved gases, and the impact of human activities on ocean chemistry.
- **Biological Oceanography:** Examines the incredible diversity of marine life, from microscopic plankton to majestic whales, their interactions with each other and the environment, and the role they play in ocean ecosystems.
- **Geological Oceanography:** Investigates the ocean floor's composition, formation, and evolution, exploring features like mid-ocean ridges, hydrothermal vents, and marine sediments.

Why Oceanography Matters:

- **Climate Regulation:** Oceans play a crucial role in regulating Earth's climate by absorbing heat and carbon dioxide. Understanding ocean dynamics is vital for predicting and mitigating climate change.
- **Food Security:** Marine ecosystems provide a significant portion of the world's food supply. Oceanography helps us manage and protect these resources sustainably.
- **Resource Exploration:** The ocean holds vast potential for resources like minerals, energy, and pharmaceuticals. Oceanography guides responsible exploration and utilization of these resources.
- **Understanding Our Planet:** Studying the ocean sheds light on Earth's history, geological processes, and the interconnectedness of our planet's systems.

Tools of the Trade:

- **Research Vessels:** Equipped with advanced technology like sonar, underwater vehicles, and sampling equipment, these vessels allow scientists to study the ocean directly.
- **Satellites:** Remote sensing technology enables scientists to monitor ocean surface temperature, currents, and chlorophyll levels from space.
- **Computer Modeling:** Complex mathematical models simulate ocean processes and predict future scenarios, informing decision-making and research.

Challenges and Opportunities:

- **Climate Change:** Ocean acidification, rising sea levels, and warming waters pose significant challenges to marine ecosystems and coastal communities. Oceanography helps us understand these impacts and develop solutions.
- **Pollution:** Plastic pollution, chemical contaminants, and overfishing threaten the health of our oceans. Oceanography is crucial for monitoring, mitigating, and preventing these threats.
- **Unexplored Depths:** The vast majority of the ocean remains unexplored, holding immense potential for scientific discoveries and new resources. Technological advancements and continued research will unlock these secrets in the years to come.

Oceanography is a dynamic and ever-evolving field with the potential to shape our future. By understanding the complex workings of our oceans, we can navigate the challenges we face and ensure a healthy and sustainable future for our planet and its inhabitants.

CONCLUSION

This is our planet. We all live here and need to keep our home clean, safe for all the plants and animals. We are not always going to like each other. But like each other or not, we must work together. Find the organization you like and reach out to them. Ours is an Environmental Army. You are our warriors fighting to protect life on this small planet. We have allies and friends. Peace and Love Everyone.



The image of Earth in space like a blue marble highlights the planet's fragility and the beauty of Earth(Image credit: NASA)

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