

Celebrate the **International Year of the Reef during 2008** and **World Ocean Day on Sunday, June 8!** This year's theme for World Ocean Day is *Helping Our Climate, Helping Our Ocean*, with a special focus on *coral reefs*. Below are some interesting facts related to coral reefs, climate, and human impact.



BIG BENEFITS¹

Coral reefs provide many benefits to humans and the oceans:

- **Storm barriers** – Because of their structure, coral reefs provide shoreline wave protection from tropical storms and hurricanes. Several million people in the U.S. live in coastal communities near coral reefs.
- **Biodiversity** – Not only are there hundreds of coral species, but coral reefs also provide habitat for over 4,000 species of fish and about 25 percent of marine life overall.
- **Nurseries for the sea** – Much like wetlands on land, coral reefs act as a nursery for the sea, providing space for fish and other marine life to spawn, hide, and feed. Many other organisms, including sponges, jellyfish, anemones, shrimp, lobster, crabs, molluscs, starfish, sea turtles, and other sea species also use reefs for habitat and raising their young.
- **Economic value** – Because of their beauty and location in warm waters, tropical coral reefs are a popular tourist attraction and provide economic benefit to coastal communities around the world. They also hold potential for new medicines.

BEACH BUMMER^{2,3}

Coastal habitats, such as tropical coral reefs and seagrass beds, are fragile ecosystems that are sensitive to human impacts like marine debris. Abandoned fishing gear and other trash can be carried by currents and caught in reefs, harming corals and the marine life they support. The effects of marine debris on coral reefs have been particularly well-documented in the Northwest Hawaiian Islands in the Pacific, which holds 69 percent of U.S. coral reefs (by area).

Trash in the ocean also kills more than one million sea birds and 100,000 marine mammals each year through ingestion and entanglement. In 2007, volunteers around the world participating in International Coastal Cleanup day, a program of the Ocean Conservancy, found 81 birds, 63 fish, 49 invertebrates, 30 mammals, 11 reptiles and one amphibian that had become entangled in ocean trash – mostly discarded fishing line, rope, and plastic bags. Fishing line and rope can wrap around flippers of marine mammals, causing a loss of circulation or cuts that can lead to bacterial infections. Plastic bags and floating trash items mistaken for food can be ingested by marine animals, causing them to starve or suffocate.



DEEP SEA VS. TROPICAL⁴

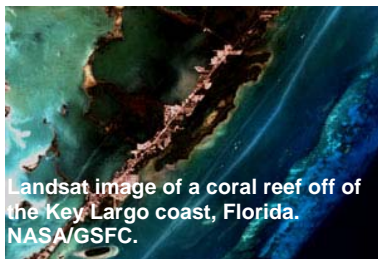
Not only are corals found in tropical waters, but some species referred to as “cold-water corals” live in the deep sea. Deep-sea coral reefs are known to exist in the Atlantic, Indian, and Pacific Oceans. In the north-eastern Atlantic, scientists have discovered over 1,300 coral species living in deep-sea reefs. The deep sea is a rich ecosystem with an amount of organisms comparable to a tropical coral reef. The species that have adapted to the deep sea ecosystem flourish with low temperatures, little or no light, and high pressure. This causes them to grow very slowly, but live for a longer time than species living in tropical habitats. The amount a tropical organism grows in one year could take a deep sea organism as many as 10 years to grow!

CLIMATE FACT: A COMING CORAL CALAMITY?^{5,6,7,8,9}

Coral reefs provide food for billions of people. In Asia alone, coral reefs are the primary source of protein for an estimated one billion people. All of the benefits of coral reefs are being threatened by two trends: increasing ocean temperatures and increasing ocean acidity. Between 1955 and 1998, world ocean heat content rose by 0.037 degrees Celsius. While this number may seem small, the same amount of energy it would take to raise the world's ocean heat content by just 0.1 degree Celsius would be enough to raise the average global atmospheric temperature to 100 degrees Celsius (the Earth's current temperature is about 15 degrees Celsius)! This rise in temperature has made waters too hot for many corals. Another problem for coral has been rising carbon dioxide (CO₂) levels. Carbon dioxide in oceans reacts with carbonate to form carbonic acid, and more CO₂ means that there is less carbonate available for corals to build the calcium carbonate that makes up their bodies. In the last 50 years, 30 percent of the World's coral reefs have died and another 30 percent have been severely damaged.



ARC Centre of Excellence for Coral Reef Studies/ Marine Photobank.



CLIMATE FACT: CORAL CRISIS^{10,11}

Just seaward of the Florida Keys lies a 130 mile long coral reef that extends from Miami to the Dry Tortugas. This reef provides habitat for over 5,500 marine species and buffers Florida and the Keys from storm surges. A combination of rising ocean temperatures, increases in ocean acidity, and runoff from farms and developments, however, is contributing to widespread declines in the world's coral populations. Some researchers estimate that within 25 years, 60 percent of the coral that is alive today will perish.

VIEWER TIPS^{12,13}

According to a 2004 survey by the American Association for the Advancement of Science, nearly eight out of 10 American adults believe that man-made stresses endanger coastal regions and oceans, and that these factors may lead to long-term damage and serious problems. Here are actions we can take to reduce the impacts on coral reefs and oceans:

- **Tidy up trash:** Whether you live near the coast or further inland, rainwater washes litter from the street into storm drains, where it can flow into your local river and, eventually, the ocean. You can help at home by throwing trash in proper receptacles or organizing a trash cleanup in your community. If you visit the beach, be sure to secure your trash items from blowing wind and place them in a trash can before you leave. If there are no trash cans in sight, collect your trash in a plastic bag and bring it home to throw away.
- **Eliminate or lessen chemical lawn fertilizer and pesticide use:** Even if you live a long distance from an ocean, chemical fertilizers and pesticides applied to your lawn can wash into your storm drain during the next rainstorm, travel through your watershed, and end up in the ocean. These chemicals can harm aquatic life.
- **Be a responsible visitor:** During your next tropical beach vacation, "take only pictures, leave only bubbles." Touching coral and their inhabitants can be dangerous for both you and them. Also, use biodegradable sunscreen if possible, or cover up with sun-protective clothing while swimming, since some sunscreen chemicals can harm corals.
- **Fish wisely:** The next time you go out on a boat for recreation or fishing, collect all of your fishing net, line, or other materials and take them back to shore to throw away in a proper trash receptacle, or try to find another use for them.
- **Volunteer:** Join over 378,000 volunteers worldwide in cleaning up your local stream, river, or beach during International Coastal Cleanup on September 20, 2008. Visit www.oceanconservancy.org for more information.
- **Learn more:** Take a visit to your local aquarium or zoo to learn more about the importance of oceans, their inhabitants, and conservation efforts to protect them.



For more information, visit **International Year of the Reef** at www.iyor.org and **The Ocean Project's World Ocean Day website** at www.theoceanproject.org/wod/.

¹ NOAA Coral Reef Conservation Program: <http://www.coralreef.noaa.gov>. *International Year of the Reef 2008*: <http://www.iyor.org/reefs/benefits.asp>.

² Ocean Conservancy: www.oceanconservancy.org.

³ U.S. Commission on Ocean Policy. "An Ocean Blueprint for the 21st Century." Chapter 18: Reducing Marine Debris. http://www.oceancommission.gov/documents/full_color_rpt/18_chapter18.pdf.

⁴ NOAA: Deep Sea Fauna; Ocean Explorer. <http://oceanexplorer.noaa.gov/explorations/05arctic/background/deepseafauna/deepseafauna.html>.

⁵ United Nations Atlas of the Oceans: The Value of Coral Reefs. Accessed Online 8 October 2007: <http://www.oceansatlas.com/> and Orr, JC et al.

⁶ "Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms." *Nature*. Volume 437, pp. 681-686 (2005)

⁷ Miles, Edward. *Multiple Stresses, Thresholds, and Ocean Acidification*. Cannon House Office Building, Washington, DC. 20 September 2007

⁸ Probasco, Mat. "Researchers Warn About Coral Reef Deaths." *The Associated Press* 24 October 2006.

⁹ United States Environmental Protection Agency. *Climate Change, Wildlife, and Wildlands: A Toolkit for Teachers and Interpreters*. Washington: GPO, 2000.

¹⁰ Probasco, Mat. "Researchers Warn About Coral Reef Deaths." *The Associated Press* 24 October 2006.

¹¹ United States Environmental Protection Agency. *Climate Change, Wildlife, and Wildlands: A Toolkit for Teachers and Interpreters*. Washington: GPO, 2000.

¹² American Association for the Advancement of Science: Survey Report, 2004. http://www.aaas.org/news/releases/2004/aaas_survey_report.pdf.

¹³ NOAA's Coral Reef Conservation Program. "Things You Can Do To Protect Coral Reefs." <http://www.coralreef.noaa.gov/outreach/thingsyoucando.html>.