

CLIMATE CRISIS

Our Planet in Peril



Don Nardo

CONTENTS

Introduction	4
Climate Change Is Speeding Up	
Chapter One	8
The Dangers of Rising Sea Levels	
Chapter Two	17
Extreme Weather Events Intensify	
Chapter Three	25
Earth's Polar Regions in Peril	
Chapter Four	32
How Climate Change Worsens Famine	
Chapter Five	40
Losses of Ecosystems and Biodiversity	
Chapter Six	49
The World's Response to the Crisis	
Source Notes	57
Related Organizations and Websites	60
For Further Research	61
Index	63

CHAPTER FIVE

Losses of Ecosystems and Biodiversity

“Forces profound and alarming are reshaping the upper reaches of the North Pacific and Arctic oceans,” warns *Los Angeles Times* investigative reporter Susanne Rust. Those ominous forces, she adds, are “breaking the food chain that supports billions of creatures and one of the world’s most important fisheries.”³⁸ From 2015 through 2021, scientists noticed serious signs of trouble in the Bering Sea (off Alaska’s western coast) and nearby waters. These included partial or total die-offs of animals on a scale larger than ever seen in the region.

For example, a variety of fish species either suffered severe decreases in numbers or completely disappeared from the waters bordering Alaska. Among them were Arctic cod and snow crabs, both of which had been abundant in that area for centuries. Several species of seabirds—including horned puffins, shearwaters, and black-legged kittiwakes—also largely vanished from the region.

At the same time, some sea creatures that normally were seen only rarely in the region moved into it in increasingly large numbers. Notable was the Pacific cod, for instance, traditionally a subarctic fish that existed in very small numbers in the cold arctic waters. Those numbers exploded, increasing by a factor of almost ten from 2010 to 2021. Especially noteworthy among the invaders are large predators, including killer whales.

Experts have confirmed that the main cause of these unprecedented and sweeping changes in the Arctic seas has been a rapid warming produced by climate change. “Long stretches of record-breaking ocean heat and loss of sea ice have fundamentally changed this ecosystem from bottom to top and top to bottom,” Rust writes. An ecosystem is a specific localized environmental area, including its animal and plant species. Rust adds, “Scientists describe what’s going on as . . . a brutal ‘regime shift,’ an event in which many species may disappear, but others will replace them.”³⁹

ecosystem
A specific localized environmental area, including its animal and plant species

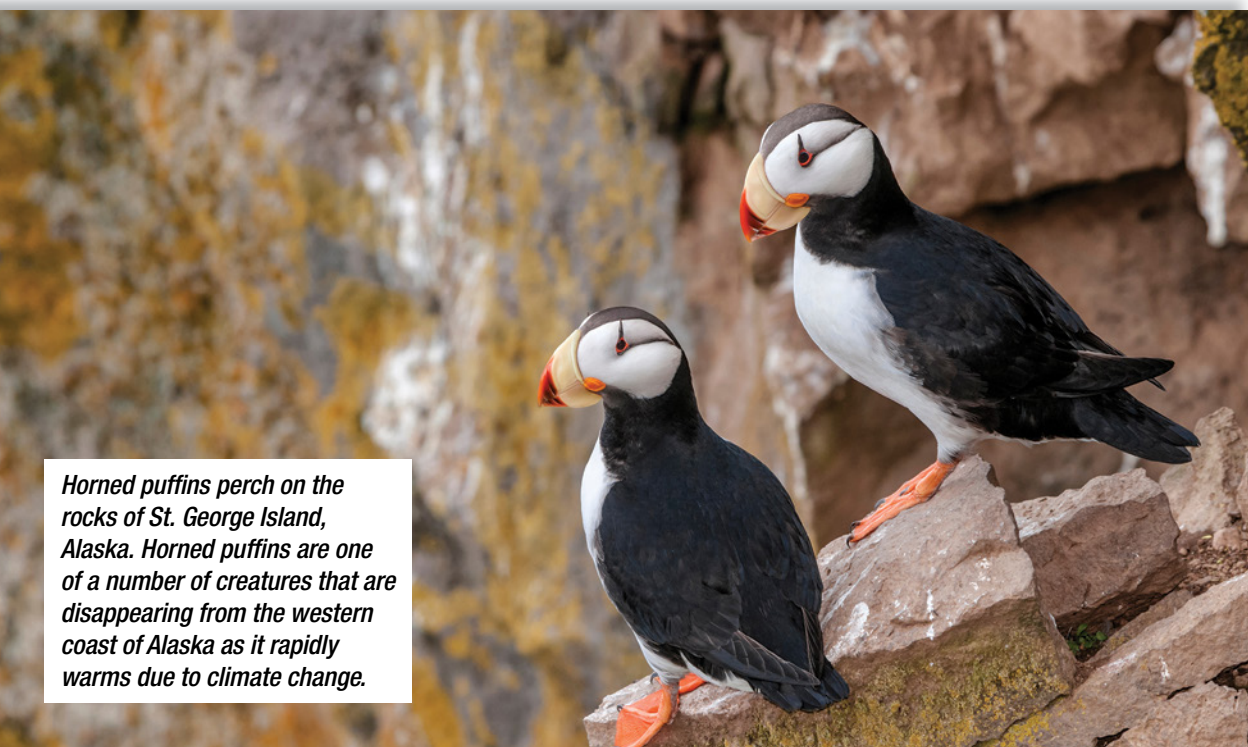
Damaged Ecosystems and Species Extinctions

Climate scientists point out that the extraordinary situation unfolding near Alaska is worrying not only for its local impacts but also because it affects people and animals across large portions of the globe. The Bering Sea and the formerly frigid waters near it long constituted one of the world’s leading fishing grounds. That ecosystem traditionally supplies more than 40 percent of the yearly US fish and shellfish catch. It is also a vital food source for residents of northeastern Russia.

As similar cold-water ecosystems around the world steadily grow warmer due to the changing climate, the balance of nature on a global scale is altering in ways similar to the situation in the Bering Sea. According to marine scientist Janet Duffy-Anderson, “Globally, cold-water ecosystems support the world’s fisheries. Halibut, all of the cod, all of the benthic crabs, lobsters,” and numerous other sea species come from such areas. Together, she says, they have long made up one of the planet’s preeminent food sources. Humanity may be witnessing the beginning of a large-scale ripple effect, she adds, that could severely damage fisheries in many regions. Therefore, “Alaska is a bellwether for what other systems can expect,” she says. Very possibly, “it’s really just a beginning.”⁴⁰

Furthermore, climate experts and biologists alike say, the cold-water regions in question are not the only planetary ecosystems that are currently being affected by climate change. Indeed, as the seas and landmasses warm, they impact all sorts of ecosystems in diverse parts of the world. Most of those systems exist in a delicate balance with neighboring ones, and when one or two ecosystems collapse or radically change, a chain reaction can occur. And in some such cases, extinction of certain plant and animal species often occurs.

Already, scientists have recorded extinctions or near extinctions of many plant and animal species. And a growing number of them have been caused by various types of human activity. That includes not only things like destroying forests, polluting the environment, and overfishing but also creating rapid climate change through the massive burning of fossil fuels. A major study reported in 2018 by the World Wildlife Fund concluded that humans have wiped out some 60 percent of bird, fish, reptile, and mammal species since 1970. In addition, at least 1 million animal and plant species are currently in danger of going extinct, in many cases primarily due to climate change.

A photograph of two horned puffins perched on a rocky cliff. The puffins have black upper bodies, white underbodies, and distinctive yellow and red beaks. They are standing on reddish-brown rocks. The background is a blurred view of the rocky coastline.

Horned puffins perch on the rocks of St. George Island, Alaska. Horned puffins are one of a number of creatures that are disappearing from the western coast of Alaska as it rapidly warms due to climate change.

Are Polar Bears Endangered or Not?

Among the animal species that climate change threatens to make extinct, one frequently mentioned in recent years is the polar bear. Members of that majestic species live on and hunt from sheets of Arctic ice. And the common wisdom is that, because climate change is melting much of that ice, those creatures are doomed. However, it appears this assumption is inaccurate. The reality, explains Brandon LaForest of the World Wildlife Fund, is that the twenty-two thousand to thirty-one thousand polar bears left are divided into nineteen local populations spread out over the northern sectors of several nations. What is often confusing, he says, is that not all of the bears are in decline. In LaForest's words, "Some [polar bear] populations are increasing, while others are declining." In areas in which sea ice is expected to last the longest, he points out, the bear groups "are holding steady, with some even reporting an increase in numbers." Thus, the bears "are not going to be extinct in the next few years, as many people say." Still, LaForest warns, the situation will be very different if all the Arctic ice melts. "With no polar ice, there will not be polar bears," he states.

Quoted in Corne Van Hoepen, "Polar Bears Have Become the Face of Climate Change. Here's the Current State of the Species," Global News, February 27, 2020. <https://globalnews.ca>.

Biodiversity's Harmonious Interactions

In addition to increasing species extinctions around the world, climate change's altering of the balance of nature in numerous places is also having a damaging effect on biodiversity. In the words of science writer Damian Carrington, biodiversity "is the variety of life on earth, in all its forms and all its interactions." It is probably the world's most complex and dynamic natural characteristic, he asserts. "More formally," he continues, "biodiversity is comprised of several levels, starting with [microscopic] genes [containing life's DNA], then individual species, then communities of creatures, and finally entire ecosystems, such as forests or coral reefs, where life interplays with the physical environment. These myriad [many] interactions have made earth habitable for billions of years."⁴¹

biodiversity

The tremendous variety of life on earth, from the microscopic level to complete ecosystems on land and in the seas



Coral reefs like this one in the Philippines are a good example of how the planet's many biodiverse elements complement one another.

Of the numerous aspects of biodiversity, the most profound, and perhaps the most crucial, is the incredibly complex way that all ecosystems and creatures work together in harmonious, interactive ways. The grand planetary respiration (breathing) cycle is a perfect and well-known example. Green plants take in carbon dioxide from the air and through the process of photosynthesis use it in building their tissues. Importantly, they expel oxygen as a by-product, and oxygen breathers—including humans and other land creatures—take in the oxygen to nourish their cells. The by-product of that process, carbon dioxide, is then absorbed by green plants, and the grand cycle endlessly repeats itself.

Another example of how the planet's many biodiverse elements complement one another can be seen in the coral reefs located near the coasts of continents. Their complex ecosystems provide living spaces for thousands of fish and other sea species. In return, some of those species eat algae, keeping it from smothering and killing the living coral. The National Geographic Society describes

SOURCE NOTES

Introduction: Climate Change Is Speeding Up

1. Quoted in Christopher Pala, "Kiribati's President's Plans to Raise Islands in Fight Against Sea-Level Rise," *The Guardian* (Manchester, UK), August 10, 2020. www.theguardian.com.
2. Jenna Scatena, "Climate Change Is Going to Be Gross," *The Atlantic*, December 18, 2021. www.theatlantic.com.
3. Scatena, "Climate Change Is Going to Be Gross."
4. Rebecca Hersher, "A Major Report Warns Climate Change Is Accelerating and Humans Must Cut Emissions Now," NPR, August 9, 2021. www.npr.org.

Chapter One: The Dangers of Rising Sea Levels

5. Quoted in France 24, "Bangladesh's Shantytowns for Climate Refugees," October 26, 2021. www.france24.com.
6. Environmental Justice Foundation, "No Shelter from the Storm: The Urgent Need to Recognize and Protect Climate Refugees," 2021. <https://ejfoundation.org>.
7. US Environmental Protection Agency, "Climate Change Indicators: Ice Sheets," 2021. www.epa.gov.
8. Christopher Flavelle and Patricia Mazzei, "Miami Says It Can Adapt to Rising Seas. Not Everyone Is Convinced," *New York Times*, March 2, 2021. www.nytimes.com.
9. US Environmental Protection Agency, "Climate Adaptation and Sea Level Rise," 2021. www.epa.gov.
10. Quoted in Hannah Miao, "Climate Change Is a Major Factor Behind Increased Migration at U.S. Southern Border," CNBC, April 18, 2021. www.cnn.com.

Chapter Two: Extreme Weather Events Intensify

11. Quoted in Rebecca Hersher, "NYC's Subway Flooding Isn't a Fluke. It's the Reality for Cities in a Warming World," NPR, September 2, 2021. www.npr.org.
12. US Environmental Protection Agency, "Climate Change Indicators: Heavy Precipitation," 2021. www.epa.gov.
13. Quoted in Senate Democrats, "What Will It Take for Senate Republicans to Recognize Climate Change Is Real and Finally Do Something About It?," March 6, 2019. www.democrats.senate.gov.
14. Oliver Millman, "Hottest Ocean Temperatures in History Recorded Last Year," *The Guardian* (Manchester, UK), January 11, 2022. www.theguardian.com.
15. Union of Concerned Scientists, "Hurricanes and Climate Change," June 25, 2019. www.ucsusa.org.

RELATED ORGANIZATIONS AND WEBSITES

Center for Climate and Energy Solutions (C2ES)

www.c2es.org

C2ES, formerly called the Pew Center on Global Climate Change, promotes reducing carbon dioxide emissions and adopting cleaner energy solutions. Its website features links to information on how both individuals and groups can support C2ES and thereby help fight climate change.

Climate Change, GlobalChange.gov

www.globalchange.gov/climate-change

This is a colorful, graphics-filled article that presents the main findings of climate scientists on the current climate crisis. Many links to related topics are provided.

Climate, National Oceanic and Atmospheric Administration (NOAA)

www.noaa.gov/education/resource-collections/climate-education-resources

This section of NOAA's website provides a simple definition for climate change, along with links to helpful articles on the subject. There are also links to climate predictions by scientists and information from the National Weather Service.

Intergovernmental Panel on Climate Change (IPCC)

www.ipcc.ch

The IPCC is the leading international organization currently studying and fighting climate change. Its website provides up-to-date reports on the activities of several IPCC working groups, and it tells how students and other everyday people can get involved in efforts to stop climate change.

World Meteorological Organization (WMO)

<https://public.wmo.int/en>

The WMO's website has many links to articles relating to global weather patterns and how they affect human civilization. Students will find links to helpful publications about climate change, and a "WMO for Youth" section provides entertaining activities related to fighting climate change.

FOR FURTHER RESEARCH

Books

Mark Boxall, *Renewable Energy: An Essential Guide*. Charleston, SC: Amazon Digital Services, 2019.

Michael E. Goodman, *The Extreme Climate*. Mankato, MN: Creative Education, 2020.

Olsin McGann, *A Short, Hopeful Guide to Climate Change*. Dublin, Ireland: Little Island, 2022.

Anthony McMichael, *Climate Change and the Health of Nations*. New York: Oxford University Press, 2019.

Carla Mooney, *Climate in Crisis*. Norwich, VT: Nomad, 2022.

David Remnick and Henry Finder, eds., *The Fragile Earth: Writings from the New Yorker on Climate Change*. New York: HarperCollins, 2020.

Internet Sources

Brodie Boland et al., “How Cities Can Adapt to Climate Change,” McKinsey & Company, July 20, 2021. www.mckinsey.com.

Alejandra Borunda, “2018 was the U.S.’s Third-Wettest Year on Record—Here’s Why,” National Geographic, February 27, 2019. www.nationalgeographic.com.

Charlotte Burton, “Climate Crisis Threatens Access to Nutrients in Fish, Study Finds,” *The Guardian* (Manchester, UK), July 20, 2021. www.theguardian.com.

EcoWatch, “Climate Change Is Destabilizing Earth’s Polar Regions,” December 16, 2021. www.ecowatch.com.

European Space Agency, “Glaciers Lose Nine Trillion Tons of Ice in Half a Century,” 2019. www.esa.int.

Imperial College London, “What Are the Impacts of Climate Change?,” 2022. www.imperial.ac.uk.

Imperial College London, “What Are the World’s Countries Doing About Climate Change?,” 2021. www.imperial.ac.uk.

INDEX

Note: Boldface page numbers indicate illustrations.

- Ajami, Hoori, 35–36
Antarctic ice shelves, 30
aquifers, 35–36
Army, US, 53–54
Army Corps of Engineers, US, 20
Asgar, Mohammad, 8
- Bamber, Jonathan L., 24
Bangladesh, 8–9
bees, **47**
Biden, Joseph, 52
biodiversity, 43–45
Burton, Katie, 33
- carbon dioxide, 11, 44, 49, 51, 52
carbon removal, 49–51
Carrington, Damian, 43, 45, 46
Center for Climate and Energy Solutions (C2ES), 24, 60
Charles, Dan, 35
Cheung, William, 39
Climate, National Oceanic and Atmospheric Administration (NOAA), 60
climate change
 acceleration of, 7
 damaging aspects of, 6–7
 genetic responses to, 46
 impact on Arctic cultures, 26
Climate Change, GlobalChange.gov, 60
Climeworks, 49
Columbia World Projects Program, 54
coral reefs, 43, **44**
- de Blasio, Bill, 17
Djordjevic, Slobodan, 17
dredging machine, 5
drought, 18, 23
 in Africa, 22
 groundwater, 34–36
 wildfires and, 24
- Druckenmiller, Matthew, 27
Duffy-Anderson, Janet, 41
- ecosystems, 41
 species extinctions and collapse of, 47
Endor, Tsina, 33
Environmental Defense Fund, 23
Environmental Justice Foundation, 10
Environmental Protection Agency (EPA), 11, 16, 18, 24
extinctions, 42
 human-influenced, 45–46
 two scenarios of, 47–48
- famine
 in Africa, numbers affected, 33–34
 drought and, 34–36
 livestock losses and, 36–37
 in Madagascar, 32–33
 threatened fish populations and, 37–39
- fish, 37–39
Flavelle, Christopher, 15, 50
floods/flooding, 10, **21**
 from precipitation events, 18–20
 of urban subways, 17, **19**
Florida Museum of Natural History, 48
- genetic changes, 46
geothermal power, 52
Gilbert, Jane, 56
glacier melts, 15
Global Thermostat, 50
greenhouse gases, 11
green technologies, 52–53
groundwater
 drought and, 34–36
 overuse of, 37
Gupta, Swati, 37
Guterres, António, 24
- habitat loss, 6, 47
Harper, Andrew, 16