



Climate History and Our Future

Earth's climate has shifted dramatically over billions of years, shaping the course of life and human history. From the formation of oceans and the rise of oxygen to the collapse of civilizations and the Little Ice Age, climate has driven both innovation and catastrophe. Today, human reliance on fossil fuels is fueling unprecedented warming, forcing societies to confront the consequences through renewable energy, adaptation, and innovation. The choices we make now will determine whether climate change drives progress or crisis in the modern world.



<p>0:00</p> <p><i>The sun appears surrounded by colorful asteroids. Earth floats in space, then a collage shows a dinosaur, mammoths on icy plains, ocean waves, and desert landscapes. Ending with a close-up of Earth on a red history book.</i></p>	<p>For billions of years on Earth, changes in climate have meant changes for life. Earth's climate affects where, how, and whether life can exist on Earth, sometimes in dramatic ways. The history of life on Earth is a story of how life has been altered by changes in climate. Today, another period of climate change is causing big changes. And we can look to history to understand how it might affect our future and whether it will usher in the next big change for humanity.</p>
<p>0:37</p> <p><i>Earth appears glowing with steam in its atmosphere, then cools as blue oceans form. Microscopic green cells float in water, representing early life. Cyanobacteria release oxygen into the air, followed by an image of Earth with the words "Oxygen Holocaust" across the sky.</i></p>	<p>The first climate-driven change in Earth's history began around 4 billion years ago. Earth was really hot, and its atmosphere was full of water vapor and gases but very little oxygen. Over time, Earth cooled down and water vapor collected, forming oceans. These young oceans are where life likely began. The earliest life was anaerobic. It didn't use oxygen to survive. But after about 2 billion years, tiny microbes called cyanobacteria evolved and they began to release a lot of oxygen into the atmosphere. All this new oxygen caused big changes on Earth. It actually poisoned and killed off a lot of anaerobic life in an event that's sometimes called the Oxygen Holocaust</p>
<p>1:36</p> <p><i>Earth is shown surrounded by oxygen bubbles. Oxygen replaces methane in animated molecules, and sunlight strikes the planet as it cools. Ice sheets spread across Earth, followed by cycles of warming and cooling shown with arrows around the globe..</i></p>	<p>But it also paved the way for more complex organisms that required oxygen to live. And it helped form Earth's atmosphere as we know it today. Oxygen began to replace most of the methane in the atmosphere. And since methane traps the sun's heat to warm Earth, replacing it with oxygen cooled things way down, ice sheets began to form across Earth. Since then, Earth has gone through several more periods of warming and cooling that changed landscapes, the atmosphere, and life.</p>
<p>2:10</p> <p><i>A grassy savannah with a lone tree is shown. Early human ancestors evolve from walking on all fours to standing upright. A close-up highlights the growth of a human brain. People appear with tools, followed by humans confronting mammoths during an ice age. Golden fields of crops are shown, representing the rise of agriculture.</i></p>	<p>Like around 6 million years ago, Earth became warmer and drier, and the grassy African savannah expanded, creating more open spaces. Some researchers think this is what led early ancestors of humans to leave trees and begin walking on two legs, which also led to more brain development. Humans began to develop new tools and technology, share stories and information, and plan ahead. This new ability to communicate and share information, which we call collective learning, allowed them to survive through an ice age between 21,000 and 24,000 years ago. Then between 5,000 and 9,000 years ago, a period sometimes called the Holocene Climate Optimum, created ideal conditions for planting crops. This led to one of the most important innovations in human history, agriculture. Farming spread to new places and helped develop new complex societies.</p>
<p>3:10</p> <p><i>Bronze tools and weapons are shown, followed by a crumbling Maya pyramid. A medieval illustration depicts people suffering during famine and cold,</i></p>	<p>Climate also continued to affect these complex societies. Warmer temperatures and drought may have caused widespread famine and led to the collapse of the Bronze Age around 1,200 BCE and the decline of the Great Mayan city-states around 900 CE. And cooler temperatures in the northern hemisphere from the 1300s to the 1800s caused a period called the Little Ice Age. During this time, periods of unusual cold and drought</p>



<p><i>framed with patches of snow, representing the Little Ice Age.</i></p>	<p>caused widespread crop failures and famines. Some historians argue that the Little Ice Age helped spark revolutions and bring about the birth of the modern world.</p>
<p>3:50</p> <p><i>Factories spew thick smoke, followed by oil fields and drilling rigs. A car is shown in front of homes, industry, and computers to represent modern energy use. Earth is surrounded by a glowing layer of greenhouse gases, then images of wildfires, floods, and hurricanes appear, showing the impacts of climate change.</i></p>	<p>And that modern world is experiencing climate change again. Only this time, it's not happening naturally. Instead, it's caused by human activities. Around 300 years ago, human societies found new energy sources called fossil fuels, beginning the modern revolution. Our societies today still run on energy created by burning fossil fuels, which light our homes, power our cars and computers, and keep us fed. But every time we use them, they release greenhouse gases that sit in the atmosphere, and trap heat from the sun, warming the planet. This warming means we're facing devastating hurricanes, wildfires, droughts, and floods.</p>
<p>4:40</p> <p><i>Solar panels and wind turbines sit under the sun. Electric cars are shown between rows of green machinery. A glowing sun is surrounded by planets, symbolizing fusion energy. Houses stand in rising floodwater beside golden crops, representing adaptation to climate change.</i></p>	<p>At the same time, many companies and countries are looking for ways to reduce greenhouse gas emissions. They're turning towards renewable energy sources like wind and solar power that don't warm the planet. People are figuring out how to use liquid hydrogen, which can already power things like vehicles, to generate and store electricity. And they're experimenting with fusion energy, which involves combining atoms to release energy. People are also working on solutions for adapting to climate change, like building homes and cities to withstand floods and extreme weather, or growing drought resistant crops.</p>
<p>5:19</p> <p><i>Four slides show the sun and Earth. A city with solar panels, wind turbines, a sailboat, and hot-air balloon appears, then a polluted red skyline with smoke and factories. It ends by asking if humanity will thrive through innovation or be slowed by climate change.</i></p>	<p>And we have hundreds of millions of years of climate history to look back on to show us the effects climate change can have and how we can respond. Will this knowledge and innovation produce an energy bonanza for humanity, propelling our societies to new heights of complexity? Or could the threat of climate change prove too much for us to solve, slowing down the progress of the modern revolution?</p>