

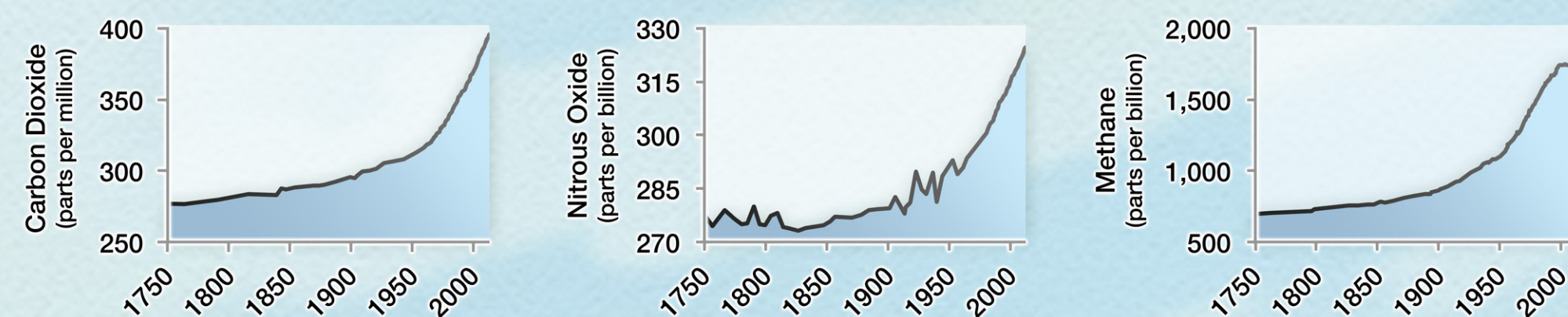
# The Anthropocene: Human Impact on the Environment

An epoch is one of the smaller divisions of geologic time. Our current epoch, the Holocene, began about 11,600 years ago. But there is growing evidence that we are entering a new epoch that could be named the Anthropocene because it is marked by extensive human impacts on the environment. This poster explores evidence that future geologists might use to define the Anthropocene.

## Atmosphere

Air pollution has many components, like the emission of greenhouse gases that lead to climate change. Carbon dioxide from burning fossil fuels and changes in land use; nitrous oxide from the increased use of fertilizers; and methane from irrigated rice agriculture, cattle, and landfills are changing climate at a rate faster than most changes seen in the geologic record.

Atmospheric Concentrations of Greenhouse Gases

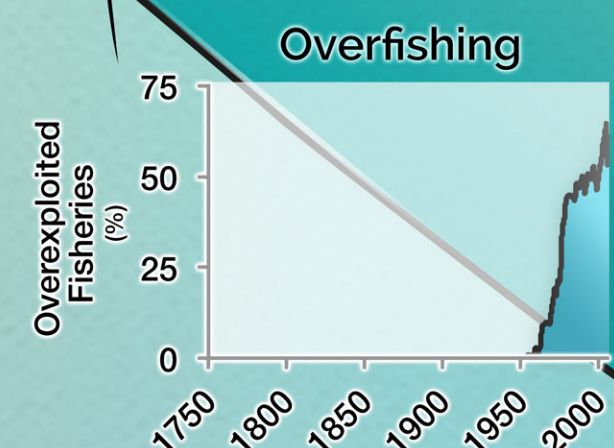


## Invasive Species

One unintended consequence of extensive global trade and travel is the rapid spread of non-native species across many localities. Invasive species change the species makeup of the environment, which will be detectable as fossils in the future.

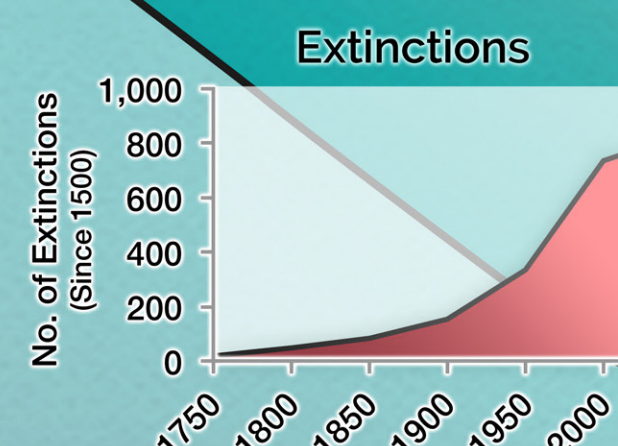
## Ocean

Overfishing depletes fish populations. Many traditional fisheries such as the Atlantic Cod have collapsed, causing immediate economic hardship, and also reverberating throughout the marine ecosystem, harming numerous other species.



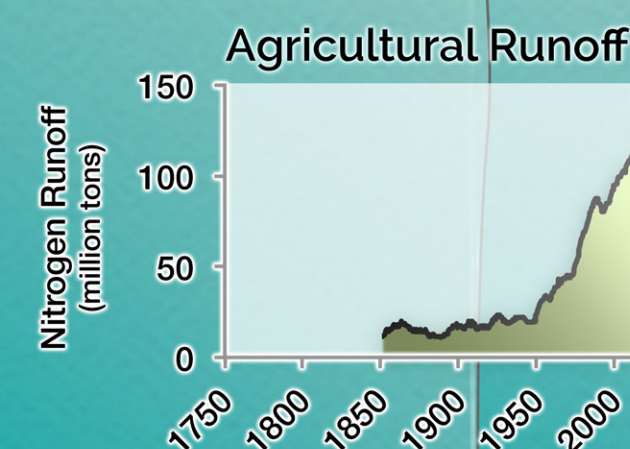
## Biodiversity

Almost 900 species have gone extinct in the past 500 years and the pace of extinctions has greatly accelerated in the past few decades, perhaps trending toward a mass extinction.



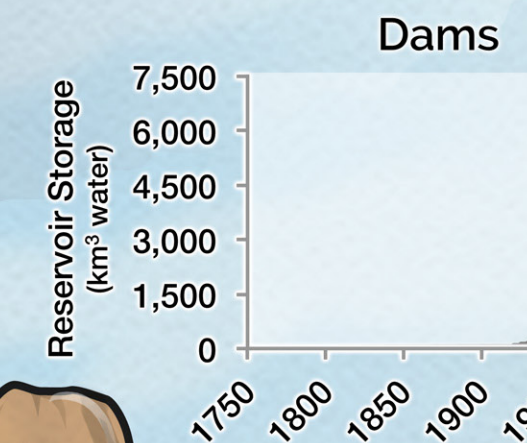
## Coastal Habitats

Coastal waters and nearshore ecosystems are vulnerable to pollution such as agricultural runoff, which carries nitrogen and phosphorus into coastal waters that feed plankton blooms that end up suffocating fish and shellfish. Industrial pollutants such as toxic heavy metals and organic compounds can also be deadly to coastal life.



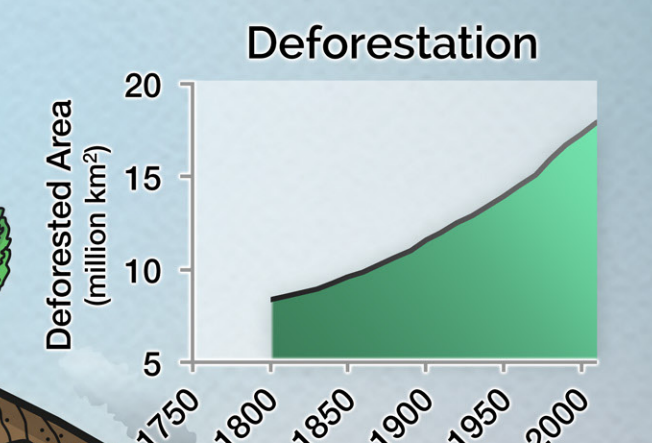
## Mining

Humans literally reshape the Earth through mining and construction, causing erosion and polluting waterways. These activities also disrupt natural geochemical cycles of metallic elements, carbon, nitrogen, and phosphorus.

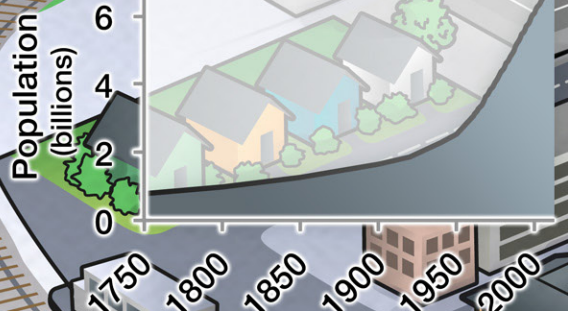


## Water Use

Humans have drastically altered rivers and watersheds all over the world. More than half of all available fresh water is being used for agricultural, industrial, and municipal uses, drastically changing seasonal runoff patterns and downstream ecosystems.



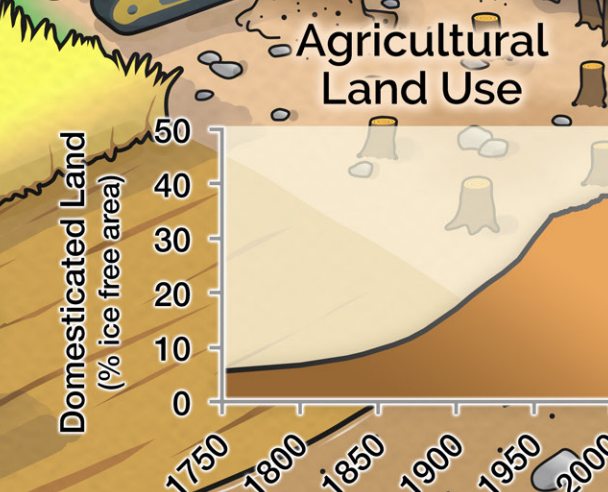
## Human Population



**Cities**  
More than 7 billion people inhabit the planet. Their demands for land, water, food, and energy are reshaping the planet.

## Farms

Natural ecosystems are converted to managed agricultural land in order to feed the world. This results in release of carbon to the atmosphere and a loss of biodiversity.



## Agricultural Land Use

## Forests

Clearing native forests for agriculture or other human development reduces biodiversity and fragments habitats, impeding the ability of species to change their geographic ranges to adapt to global warming.

ANTHROPOCENE EPOCH?

HOLOCENE EPOCH

PLEISTOCENE EPOCH

Begins with: Start of Ice Ages affecting both hemispheres of Earth  
Characterized by: Ice Age animals, e.g., saber-toothed tiger, mammoth

Begins with: End of the last Ice Age  
Characterized by: Modern animal species, modern landscape

Begins with: Atomic Age, industrialization, globalization  
Characterized by: Changes in landscape, ocean and atmospheric chemistry, species extinctions and invasions

## Defining the Anthropocene

Each geologic epoch is defined by a unique marker in the rock strata, the sharper and more global the marker, the better. Markers can be fossils of new forms of life, or a chemical signal—like the high concentration of the element iridium produced when an asteroid hit Earth 66 million years ago, leading to a mass extinction.

Scientists are considering what the most useful markers for the beginning of the Anthropocene will be. Candidates include roads, microplastics, mercury from air pollution, and radionuclides from nuclear weapons testing. Various markers would put the start of the Anthropocene as early as the beginning of the industrial revolution or as recently as the beginning of widespread globalization in the 1950s.

What will characterize the fossil record of the Anthropocene? Our actions could determine whether the epoch is marked by diminishing biodiversity or even a mass extinction.