













Box 1.1 History of Use and Abuse

Many of the challenges we face today—deforestation, soil erosion, desertification, salinization, and loss of biodiversity—were problems even in ancient times. What is different now is the scale, speed, and long-term nature of modern civilization's challenges to Earth's ecosystems. Before the industrial revolution, environmental degradation was much more

gradual—occurring over hundreds or thousands of years—and relatively localized. The cumulative actions of rapidly growing and industrializing societies, however, have given rise to more complex problems. Acid rain, greenhouse gas emissions, ozone depletion, toxic waste, and large-scale industrial accidents are examples of such problems with global or regional consequences.

<p>7000 BC– 1800 BC</p> 	<p>Mesopotamia/Sumer</p> <p><i>Salinization and waterlogging of Sumer's agroecosystem</i></p>	<p>Around 7000 BC, people in this region (now, largely, Iraq) began to modify the natural environment. Lacking adequate rainfall, land had to be irrigated for cultivation, and the demand for food increased as the population grew. The irrigated land became salinized and waterlogged. Records noting “the earth turned white” with salt date back to 2000 BC. By 1800 BC, the agricultural system—the foundation of Sumerian civilization—collapsed.</p>
<p>2600 BC– present</p> 	<p>Lebanon</p> <p><i>Overuse and exploitation of Lebanon's cedar forest</i></p>	<p>At one time, Mount Lebanon was covered with a forest of cedars that were famous for their beauty and strength. Solomon's temple was built of cedar from this area as were many Phoenician ships. In the third millennium BC, Byblos grew wealthy from its timber trade. The Egyptians used cedar timber for construction and used the resin for mummification. The exploitation continued through the centuries. Only four small groves remain today.</p>
<p>2500 BC– 900</p> 	<p>Mayan Empire</p> <p><i>Soil erosion, loss of agroecosystem viability, and water siltation in Central America</i></p>	<p>Mayans lived in what are now parts of Mexico, Guatemala, Belize, and Honduras. The agriculture techniques they used were creative and intensive—clearing hillsides of jungle, terracing fields to contain soil erosion, draining swamps by digging ditches and using the soil from the ditches to form raised fields. Eventually too much was demanded of this system. Soil erosion reduced crop yields, and higher levels of silt in rivers damaged the raised fields. Decreased food production and competition for the remaining resources may have led to that civilization's demise.</p>
<p>800 BC– 200 BC</p> 	<p>Greece</p> <p><i>Conversion and deforestation in the Mediterranean</i></p>	<p>In Homeric times, Greece was still largely covered with mixed evergreen and deciduous forests. Over time the trees were cleared to provide land for agriculture, fuel for cooking and heating, and construction materials. Overgrazing prevented regeneration. The olive tree, favored for its economic value, began to flourish in ancient Greece because it grew well on the degraded land.</p>
<p>200 BC– present</p> 	<p>China</p> <p><i>Desertification along the Silk Road</i></p>	<p>The fortification of the Great Wall during the Han dynasty gave rise to intensive cultivation of farmland in northern and western China and to the growth of a major travel and trade route that came to be known as the Silk Road. Deserts began irreversibly expanding in this area as a result of the demands of a growing population and gradual climate changes.</p>
<p>50 BC–450</p> 	<p>Roman Empire</p> <p><i>Desertification and loss of agroecosystem viability in North Africa</i></p>	<p>The challenge of providing food for the population of Rome and its large standing armies plagued the empire. The North African provinces, once highly productive granaries, gradually became degraded as Roman demands for grain pushed cultivation onto marginal lands, prone to erosion. Scrub vegetation spread and some intensively cultivated areas became desertified. The irrigation systems the Romans used depended on watersheds that have since been deforested, and now yield less runoff, reducing the chance of restoring productivity.</p>

<p>1400–1600</p> 	<p>Canary Islands</p> <p><i>Human and natural resource exploitation, degradation and extinctions in many regions</i></p>	<p>Originally from North Africa, the Guanches were a people who inhabited the Canary Islands for more than 1,000 years before the Spanish arrived in the 1400s. The Spanish enslaved the Guanches, cleared the forests, and built sugar cane plantations. By 1600 the Guanches were dead, victims of Eurasian diseases and plantation conditions. As in the Canary Islands, regions in the Americas, Africa, and Asia where people were forced to grow and export cash crops such as sugar, tobacco, cotton, rubber, bananas, or palm oil, continue to suffer from deforestation, soil damage, biodiversity losses, and economic dependency instituted during colonization.</p>
<p>1800</p> 	<p>Australia and New Zealand</p> <p><i>Loss of biodiversity and proliferating invasive species in island ecosystems</i></p>	<p>There were no hoofed animals in Australia and New Zealand before Europeans arrived at the end of the 18th century and began importing them. Within 100 years there were millions of sheep and cattle. The huge increase in grazing animals killed off many of the native grasses that were not well adapted to intensive grazing. Island biodiversity worldwide suffered some of the most dramatic losses after nonnative plants and animals were introduced. Island flora and fauna had developed in isolation over millennia and thus lacked natural predators. Many island bird species, for example, were flightless and became easy prey for invaders. It is estimated that 90 percent of all bird extinctions occurred on islands.</p>
<p>1800</p> 	<p>North America</p> <p><i>Conversion, loss of habitat, and unrestrained killing of wildlife in North America</i></p>	<p>As land was cleared for settlement and cultivation around the world, animal habitats of almost every kind were reduced; animals were killed for food, hides, or recreation as commerce spread. In North America, herds of bison, totaling perhaps as many as 50 million, were hunted to near extinction by the end of the 19th century. Aquatic as well as terrestrial species became targets of exploitation and extinction. In the 19th century, whales were killed in large numbers to support industrializing economies in need of whale oil in great quantity, mainly for lighting and lubricants. On the northwest coast of North America, whale populations were on the verge of extinction by the 20th century.</p>
<p>1800–1900</p> 	<p>Germany and Japan</p> <p><i>Industrial chemical poisoning of freshwater systems</i></p>	<p>The industrial revolution had a profound impact on the waters of the world. Rivers that ran through industrial zones, like the Rhine in Germany, or rivers that ran through mining zones, like the Watarase in Japan, became heavily polluted in the 19th century. The German chemical industry poisoned the Rhine so badly that salmon, which had been plentiful as late as 1765, were rare by 1914. Japan's most important copper mine in the 1800s dumped mine tailings in the Watarase River, and sulfuric acid from smelters contaminated the water and killed thousands of hectares of forest trees and vegetation. Fish and fowl died and local residents became sick. The human birth rate dipped below the death rate in the nearby town of Ashio in the 1890s.</p>
<p>1900</p> 	<p>United States and Canada</p> <p><i>Soil erosion and loss of biodiversity in the United States and Canada</i></p>	<p>The Great Plains of the United States and Canada were ploughed in the late 19th and early 20th centuries and planted with new forms of drought-resistant wheat. Once the protective original grass cover was destroyed, drought in the 1930s enabled high, persistent wind storms to blow away much of the dry soil. Soil conservation methods were subsequently introduced such that when wind erosion again affected the area in the 1950s and in the 1970s, the consequences were less severe.</p>
<p>1928–present</p> 	<p>Worldwide</p> <p><i>Industrial chemicals deplete the world's protective ozone layer</i></p>	<p>Chlorofluorocarbons (CFCs) are a family of volatile compounds invented in 1928. Thought to be the world's first nontoxic, nonflammable refrigerants, their use grew rapidly. They also were used as industrial solvents, foaming agents, and aerosol propellants. CFC production peaked in 1974, the same year researchers noted that CFC emissions could possibly damage human health and the ozone layer. In 1985, the discovery of an "ozone hole" over the Antarctic coincided with a first-ever coordinated international effort to phase out production of CFCs and other ozone-depleting substances. Worldwide phase out of CFC production is scheduled for 2010.</p>