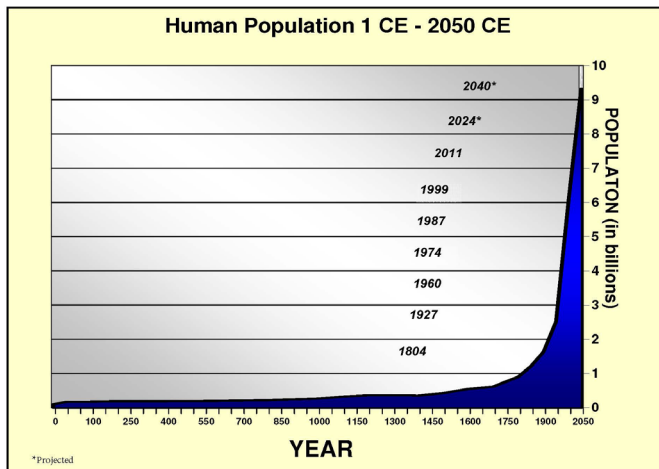


The Basics of Population Education

Teachers: The following facts and principles form the backbone of our Population Education materials. Each of our activities is designed to communicate one or more of the following concepts, all of which are integral to a working understanding of the relationships between people, resources and the environment. You may wish to use this collection as a whole to prepare an introduction to a unit on population, or you may wish to use one segment at a time as a preface or conclusion to individual activities.

World Population History: The Numbers



2015 Population Connection

Year	Population	Years Elapsed
10,000 BCE	5-10 Million	3,000,000
1 CE	170 Million	10,000
1804	1 Billion	1,804
1927	2 Billion	123
1960	3 Billion	33
1974	4 Billion	14
1987	5 Billion	13
1999	6 Billion	12
2011	7 Billion	12
2024*	8 Billion	13
2040*	9 Billion	16

*Projected by the U.N.

A graph of human population before the agricultural revolution would likely have suggested a wave, reflecting growth in times of plenty and decline in times of want, as graphs of other species' populations continue to look to this day. The graph of recent human population growth is referred to as a "J curve," as it follows the shape of that letter, starting out low and skyrocketing straight up.

What Enabled Population Growth?

Agriculture: About 12,000 years ago, several cultures shifted from hunting and gathering to farming. Humans became the first and only species ever to control our own food supply, and steady population growth was the result. In the absence of other limiting factors, any population will expand to the limit of its food supply; this happens so reliably that it is considered a law of ecology.

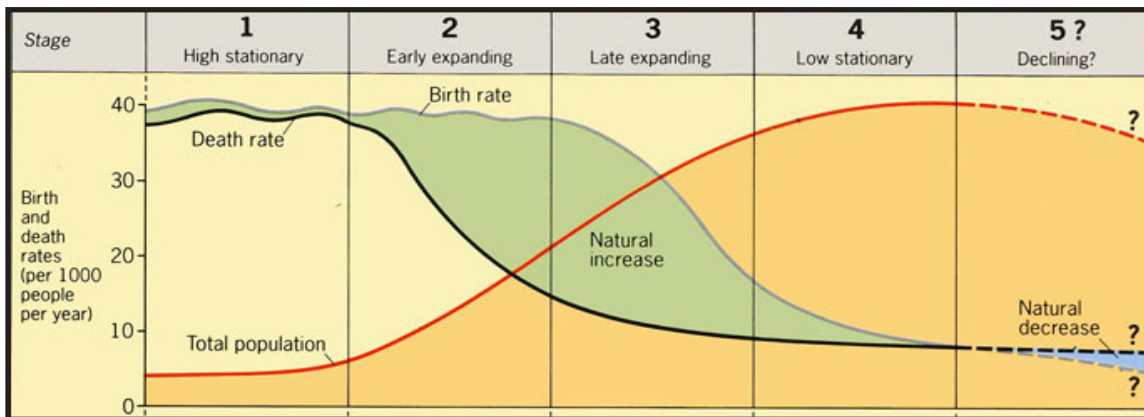
Technology: The development of agriculture led to changes in settlement, division of labor, mathematics, literacy, and science. By about 1800, major advances collectively referred to as the "Industrial Revolution" were occurring. Breakthroughs in medicine, nutrition and sanitation brought down child mortality rates and led to longer life spans. The mechanization of agriculture and improvements in food preservation led to even greater increases in food production and availability. Human numbers began doubling at an unprecedented pace.

World Population Today

As of 2015, world population is at approximately 7.3 billion people and growing. While world population growth continues to slow from its peak growth rate in the 1960s, we are still adding approximately 80 million people a year to the planet at our current growth rate of 1.2 percent. At this rate, we add the equivalent of another Hong Kong every month, and a Germany each year. China and India are the two most populous countries, each with more than a billion people. At 321 million people, the United States is the third most populous nation.

The Demographic Transition Model

Most of the world's population growth today is occurring in less developed countries, where birth rates are high. The Demographic Transition Model shows the stages of countries' populations moving from high birth and death rates to low birth and death rates as they industrialize and their economies grow. More developed countries are at Stage 4 or 5 in this model, while the least developed countries have stagnated in Stage 2 or 3. Virtually all of projected world population growth this century is expected to come from less developed countries.



World Population in the Future

Demographers expect world population to continue to grow through this century, reaching over 11 billion by 2100. In making projections, demographers consider likely fertility trends (number of children born per woman), as well as variables that could affect life expectancy such as trends in health, pandemics, war and food security. Every other year, the United Nations releases new projections.

A population eventually stabilizes once the fertility rate reaches a two-child average. Even once this replacement fertility is reached, the population will continue to grow until the proportion of young people is equal to that of older people. This can take 60-70 years. In the world today, there are three times as many people under the age of 15 as over age 65. With such a large segment of the population yet to start bearing children, the population is expected to grow through this century, even as fertility rates are dropping.

Experts agree that the status of women around the globe is a key to population stabilization. In places where girls have equal access to an education and women have economic opportunity, families have fewer children.

Understanding Carrying Capacity

Why is it important for world population to stop growing? The Earth is a finite system and has a carrying capacity for how many people can be adequately supported without degrading the environment and habitats of other living things. Sometimes people look at vast open spaces in our country and around the world and think that there is plenty of space to accommodate a growing population. However, carrying capacity isn't about physical space – it's about the types of land and resources available to sustain life. For instance, arable land must be available to grow the food for people living in cities and suburbs, and trees and other plants must be left to produce the oxygen we all need.

How many people can the Earth support? That depends on people's lifestyles, which impacts the rates at which resources are consumed. In more affluent countries, resources are consumed at a greater pace to enable residents to eat a diet with more animal products, use more energy in homes, and produce more goods. So, if everyone lived as they do in wealthier countries, fewer people could be supported by Earth's resources than live on the planet today. The average rates at which people consume resources like oil and metals, and produce wastes like plastics and greenhouse gases are about 32 times higher in North America, Western Europe, Japan and Australia than they are in the developing world.¹ In the least developed countries, people use fewer resources, but often suffer from malnutrition and fewer opportunities to lead healthy lives and contribute to their nation's economy.



Global demand for natural resources has doubled in the past 50 years. Our **ecological footprint** is a measure of how fast we consume resources and generate waste compared to how fast nature can absorb our waste and generate new resources. Scientists calculated that since the 1970s, our demand for resources has exceeded what the Earth can regenerate in a year. It now takes 1.6 years to regenerate what we use in one year.² Rather than consider how many people *could* live on Earth, we should consider a **sustainable** number of people and resources that raises the standard of living around the globe without degrading the environment.

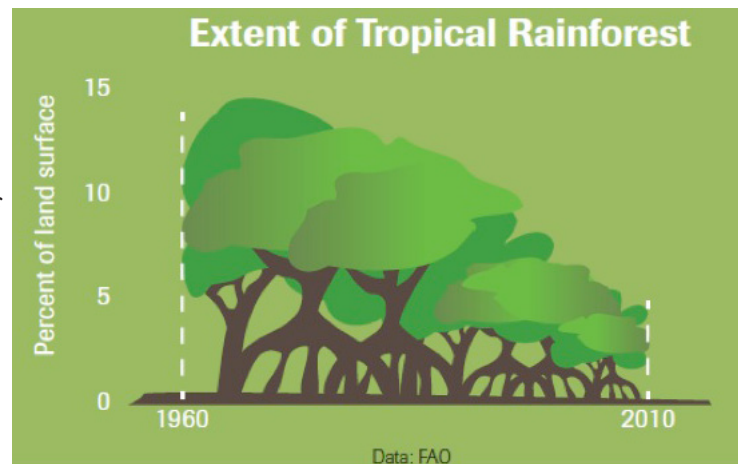
Environmental Impacts

There are many ways in which our large and growing human population impacts the global environment. Using resources faster than they can be replenished is just part of the issue. Over the past 50 years, humans have altered ecosystems more rapidly and extensively than in any other comparable period in history, primarily to meet the rapidly growing demands for food, fresh water, timber, fiber and fuel.

Climate Change: Our global temperature is on the rise due to the ever-increasing amount of greenhouse gases that are emitted through human activities including fossil fuel use, deforestation and livestock grazing. This warming is causing sea level rise from Arctic ice melt, more extreme weather, and loss of habitat including coral reefs. Population growth only exacerbates climate change, as more people demand more food and energy. With renewable energy supplying only a small fraction of total energy use, fossil fuel use is expected to expand for the foreseeable future.

Water Scarcity: About 35 percent of the world's people already face chronic water shortages.³ As the population grows, more water is needed for agriculture and industry, as well as for domestic uses. A child born in the developed world consumes 30-50 times as much water as one born in the developing world.⁴ The worldwide supply of clean, accessible water is further reduced by pollution. In 2011, 768 million people were without safe drinking water and 2.5 billion lacked basic sanitation.⁵

Biodiversity Loss: Nearly all of the world's ecosystems are shrinking to make way for more humans and their homes, farms, factories and shopping centers. Globally, 13 million hectares of forest (about the size of Costa Rica) were lost each year from 2000 to 2010, as much of it was cleared or degraded from human activities.⁶ Forests play an important part in climate change mitigation. Forests store a vast amount of carbon. When a forest is cut down and converted to another use, carbon is released back into the atmosphere.



The World Wildlife Fund's Living Planet Index shows a 30 percent decline in the Earth's biodiversity since 1970; a 60 percent decline in the tropics.⁷ According to the World Conservation Union, 1 in 3 amphibians, 1 in 4 mammals, 1 in 8 seabirds and 70 percent of plants are at risk of extinction due primarily to human alteration of their habitats.⁸ Humans depend on a rich biodiversity for survival – food, medicines, climate regulation and more.

What Will the Future Hold for People and the Planet?

Sustainability can be achieved if the population stabilizes and resources are used efficiently. The good news is that the very conditions that will help the population stabilize are those that help people live longer, healthier lives, raise healthier children and enjoy greater prosperity. These include universal education and gender equality, access to reproductive health care and family planning services.

Achieving ecologically sustainable lifestyles will take ingenuity and a sense of shared responsibility for the ecosystems that sustain us all. Richer nations will need to reduce their large footprints and emerging economies will need to find new models of growth to improve their citizens' well-being in ecologically sustainable ways.

Recommended Resources

Reference Sources:

CIA World Factbook – An online database with population information for every country and world region. <https://www.cia.gov/library/publications/the-world-factbook/>

Population Reference Bureau – Find the most up-to-date population data for all countries. www.prb.org/DataFinder

United Nations Population Information Network – A guide to population information that can be found on the UN website. www.un.org/popin

U.S. Census Bureau – U.S. and international population data and resources for teachers. www.census.gov

Background Information and Multimedia Resources

Los Angeles Times, *Beyond 7 Billion* – Well researched series of stories, videos, maps, photos and narrated graphics on world population history and current challenges. www.latimes.com/news/nationworld/world/population

Marketplace, *Food for 9 Billion* – This website accompanies a year-long radio series. The interactive world map and Food through the Ages timeline are great teaching tools. www.marketplace.org/topics/sustainability/food-9-billion

National Geographic – An expansive collection of resources exploring how we arrived at 7 billion people on the planet and what that means for the future. <http://ngm.nationalgeographic.com/?fof=Y>

Population Education – Your one-stop site for lesson plans and background materials. Watch *World Population*, a 7-minute animation of the history of world population. www.populationeducation.org

Science Magazine, *Special Population Issue* – Articles, graphics and an educational video about population figures, trends and projections. www.sciencemag.org/site/special/population

The World Bank – An on-line learning module about Population Growth Rate, developed by the World Bank. www.worldbank.org/depweb/english/modules/social/pgr

1 Jared Diamond, "What's Your Consumption Factor?" New York Times, January 2, 2008.

2 Global Footprint Network, www.footprintnetwork.org.

3 Matti Kummu, Water and Development Research Group, Aalto University, Finland, environmentalresearchweb.org.

4 UNESCO (2003). "Political inertia exacerbates water crisis, says World Water Development Report, First UN system-wide evaluation of global water resources". Press Release, 5 March 2003. United Nations Educational, Scientific and Cultural Organization: Paris.

5 WHO, www.who.int/water_sanitation_health/monitoring/jmp_fast_facts/en/ "Progress on sanitation and drinking water: Fast Facts" 2013

6 Food and Agriculture Organization of the United Nations, Global Forest Resource Assessment 2010.

7 World Wildlife Fund, Living Planet Report 2012.

8 Jean-Christophe Vie, et. al., Editors, "Wildlife in a Changing World: An Analysis of the 2008 IUCN Red List of Endangered Species," IUCN, Gland, Switzerland, 2009.