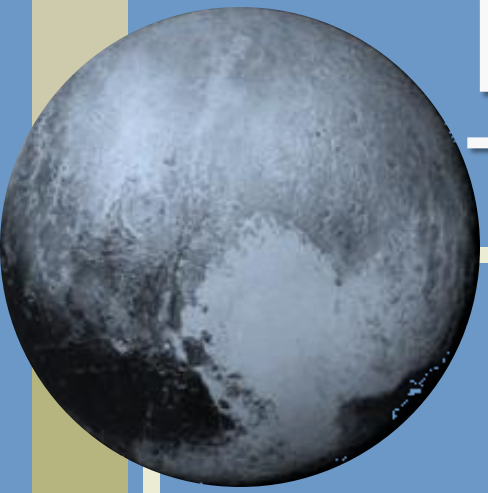


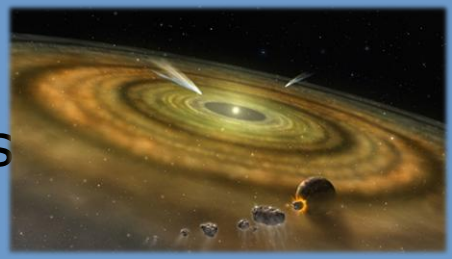
History in a Nutshell: The Big Picture

For the vast majority of world history, human life - both culture and biology - was shaped by scarcity.

Martha Beck

Geologic Time

Just for fun, pretend the age of the earth (4.5+ billion years) is compressed into one calendar year.



- January 1 - planets formed
- early March - liquid water stood in pools
- late March - earliest life
- July - oxygen became important part of atmosphere
- October 25 - multicellular organisms
- late November - plants and animals abundant
- December 15-25 – dinosaurs rose and disappeared
- December 31, 11:20 pm - humans appeared
- 1 second before midnight - automobile invented

When did humans arrive on the scene?

Humans first evolved in Africa, and much of human evolution occurred on that continent. The fossils of early humans who lived between 6 and 2 million years ago come entirely from Africa.

Most scientists currently recognize some 15 to 20 different species of early humans. Scientists do not all agree, however, about how these species are related or which ones simply died out. The majority of early human species left no living descendants.

Scientists also debate over how to identify and classify particular species of early humans, and about what factors influenced the evolution and extinction of each species.

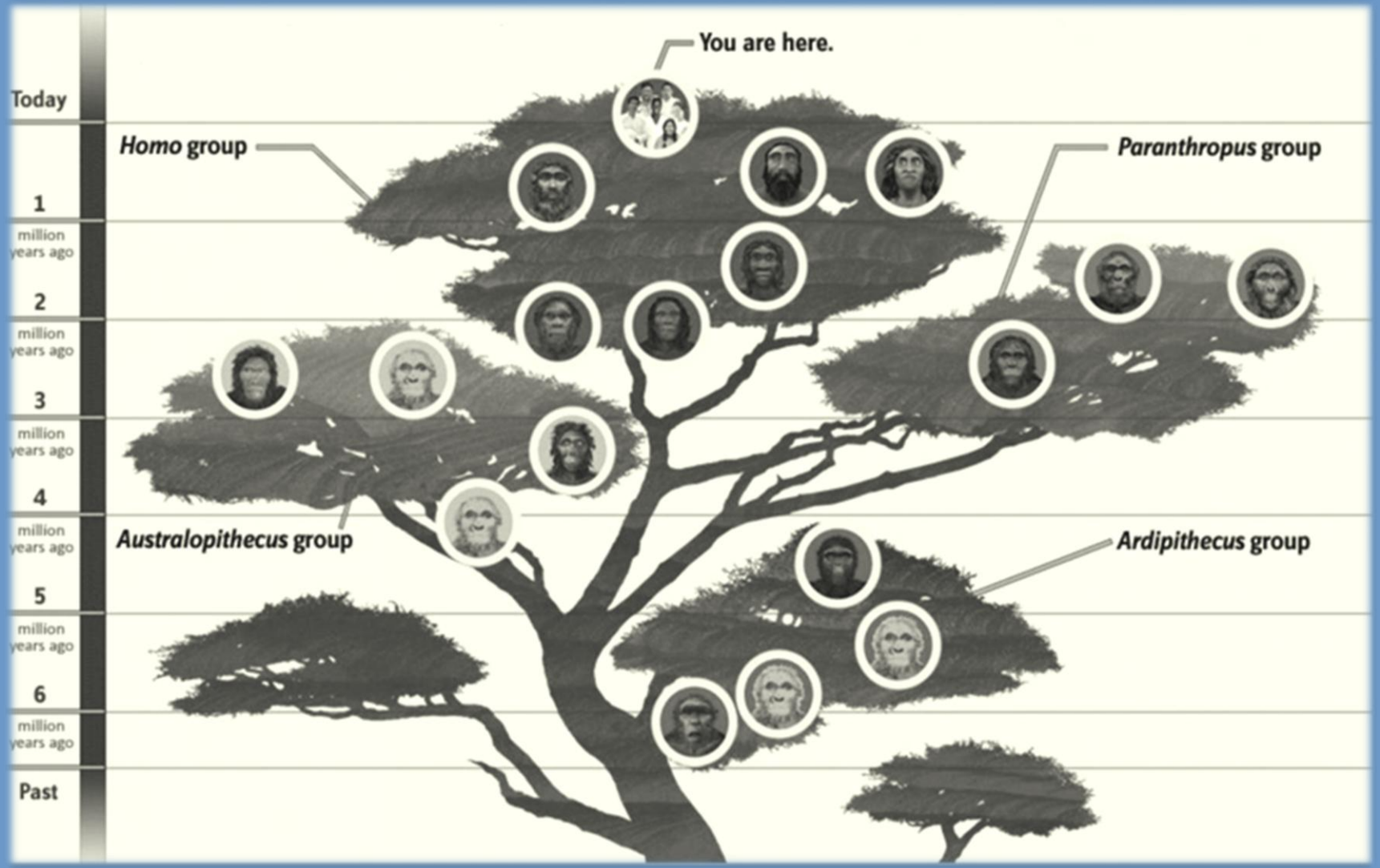
When did humans arrive on the scene?

Early humans first migrated out of Africa into Asia 2 million-1.8 million years ago. They entered Europe somewhat later, 1.5 million-1 million years. Species of modern humans populated parts of the world much later.

For instance, people first came to Australia within the past 60,000 years and to the Americas within the past 30,000 years. The beginnings of agriculture and the rise of the first civilizations occurred within the past 12,000 years.

Neanderthals Were People, Too

Human Evolution



Hunting-Gathering

- hunting-gathering: humanity's only economic activity for at least 90% of our existence
- population: small groups of 40-60, low densities (1 person/mi^2)
- egalitarian: Every person performed essential functions.

Three Great Human Revolutions

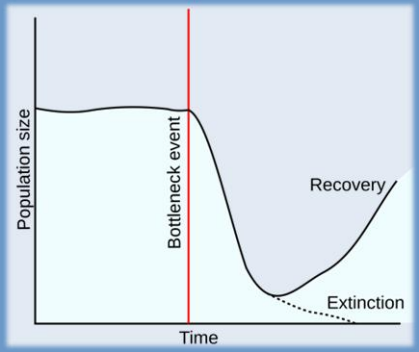
- The Evolutionary Great Leap Forward
- The Agricultural (Neolithic) Revolution
- The Industrial Revolution

The Evolutionary Great Leap Forward

Around 60,000 years ago the Earth was in the middle of an ice age that froze the north, but in Africa it caused different problems.

The ice sheets sucked up much of the world's moisture, causing widespread droughts particularly in Africa where the tropical latitude, the intense sunshine and the lower moisture levels had a major environmental effect.

There were as few as 2,000 humans in existence, all in Africa. It was the worst time in the history of our species and one we nearly didn't survive.



The Evolutionary Great Leap Forward

But something important happened in Africa. Tools became much more finely crafted. They were made of materials like bone, which allowed the development of deadlier weapons. Group hunting methods became more efficient.

Art also made an appearance - clear evidence that our ancestors were capable of abstract, contemplative thought. Overall, it really isn't exaggerating to talk about a great leap forward in mental abilities.

The by-product of these changes was that we gained the skills to leave Africa in earnest ... not the tentative movement around Eurasia that had been made by our hominid ancestors, but a full onslaught.

The Evolutionary Great Leap Forward

We can trace two routes - one along the southern coast of Asia, which reached Australia around 50,000 years ago. Another route, inland via the Middle East, would lead to the settlement of Europe by around 35,000 years ago and to the Americas (via the Siberian arctic) 20,000 years later.

Along the way our ancestors encountered conditions that tested their abilities to the limit, but the great leap had given them the survival tools that allowed them to adapt.

The billions of humans alive today expanded from that small population living in Africa around 60,000 years ago.

The Evolutionary Great Leap Forward

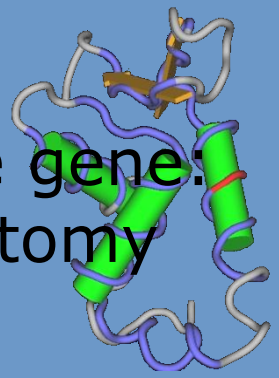
emergence of:

- a capacity for innovation
- fish hooks
- bows and arrows
- needles
- engravers
- awls
- playing music
- exchanging and bartering with other groups
- organization of living space
- rituals
- art
- jewelry (beads at first)
- cooking
- exploration of less hospitable geographic areas
- navigation/boating (Australia from New Guinea)

Lascaux Caves, France

The Evolutionary Great Leap Forward

Proposed Causes:



- a major genetic mutation in a language gene: (FOXP2) altered tongue and larynx anatomy leading to language
- brain organization change
- drop in the level of circulating testosterone contributed to the ability of humans to live in cooperative communities peacefully, which then led to permanent settlements and eventually civilization
- a change in eating habits

The Overkill Hypothesis

The overkill hypothesis argues that humans were responsible for the Late Pleistocene extinction of mega fauna in northern Eurasia and North and South America. Some scientists see a chronological *and* causal link between the appearance of humans and the disappearance of many species of large mammals.

According to the overkill hypothesis, when humans entered North America they encountered a large number of species that had no experience with humans and did not recognize humans as a threat.

Humans were able to take advantage of this and hunt large mammals with great ease. They became specialist big game hunters concentrating on game like mammoths, giant bison, sloths and other large species.

The Overkill Hypothesis

Humans hunted dozens of species to the point of extinction, and indirectly caused the extinction of many smaller species.

With the availability of so much meat human populations were able to increase and spread rapidly.

Deinothere, Europe

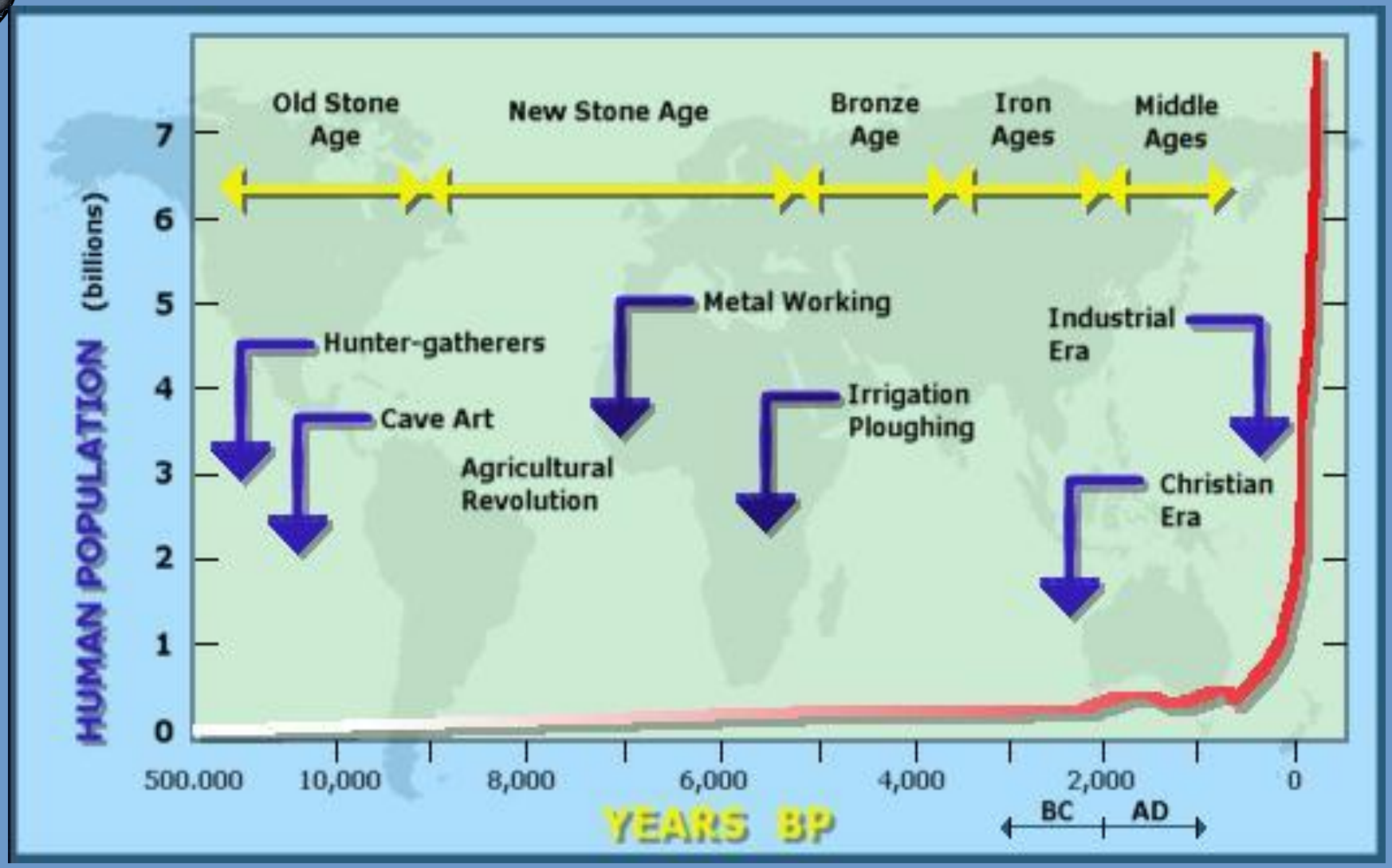
Giant Extinct Moa, New Zealand

Skeleton of Giant Ground Sloth, Los Angeles

Hunting-Gathering

For hundreds of thousands of years hominids depended on nature for their survival. Food came from wild plants and animals. A natural disaster could reduce the amount of food in the environment which might have a devastating effect on people in nearby regions.

Human Population Growth

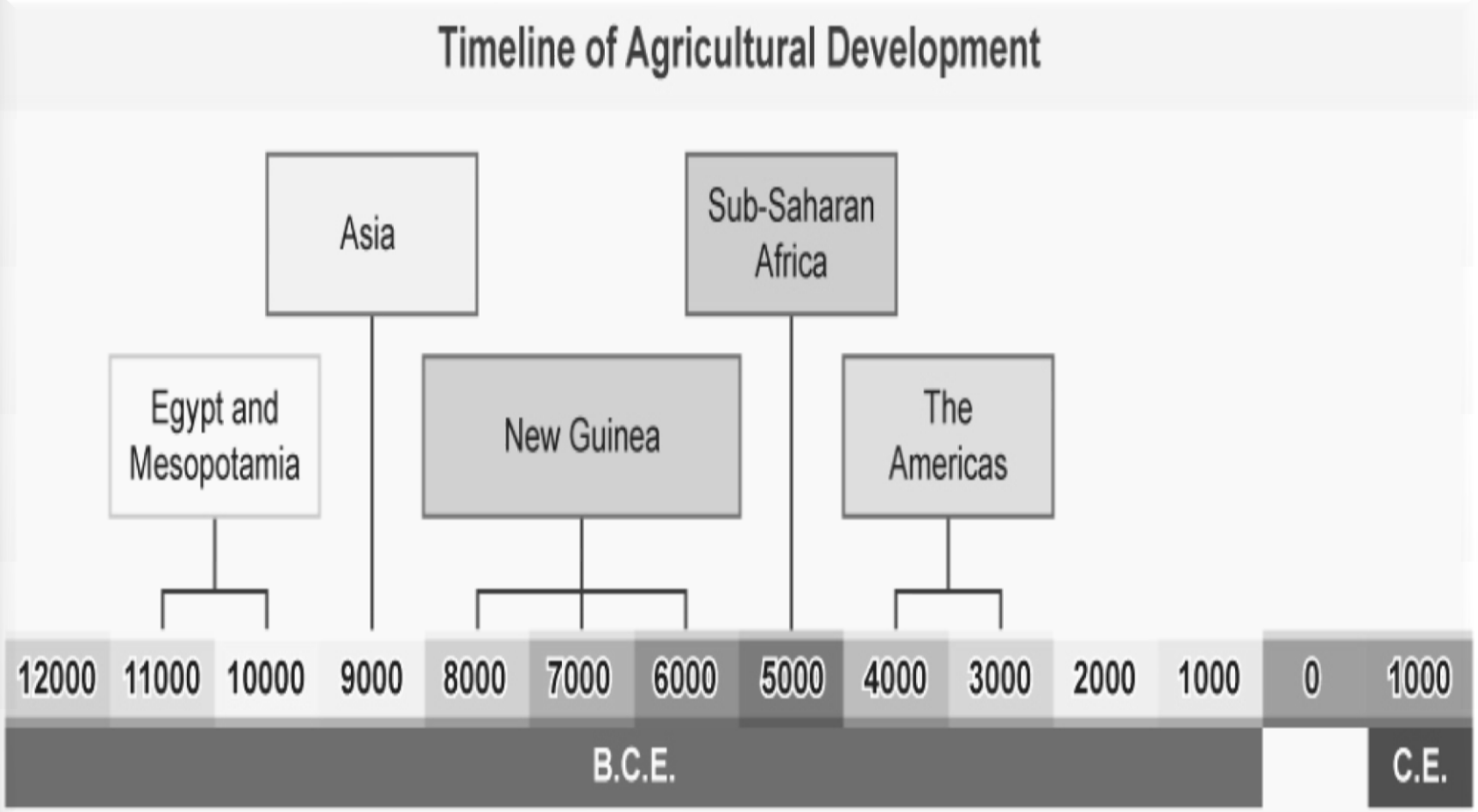


The Agricultural (Neolithic) Revolution

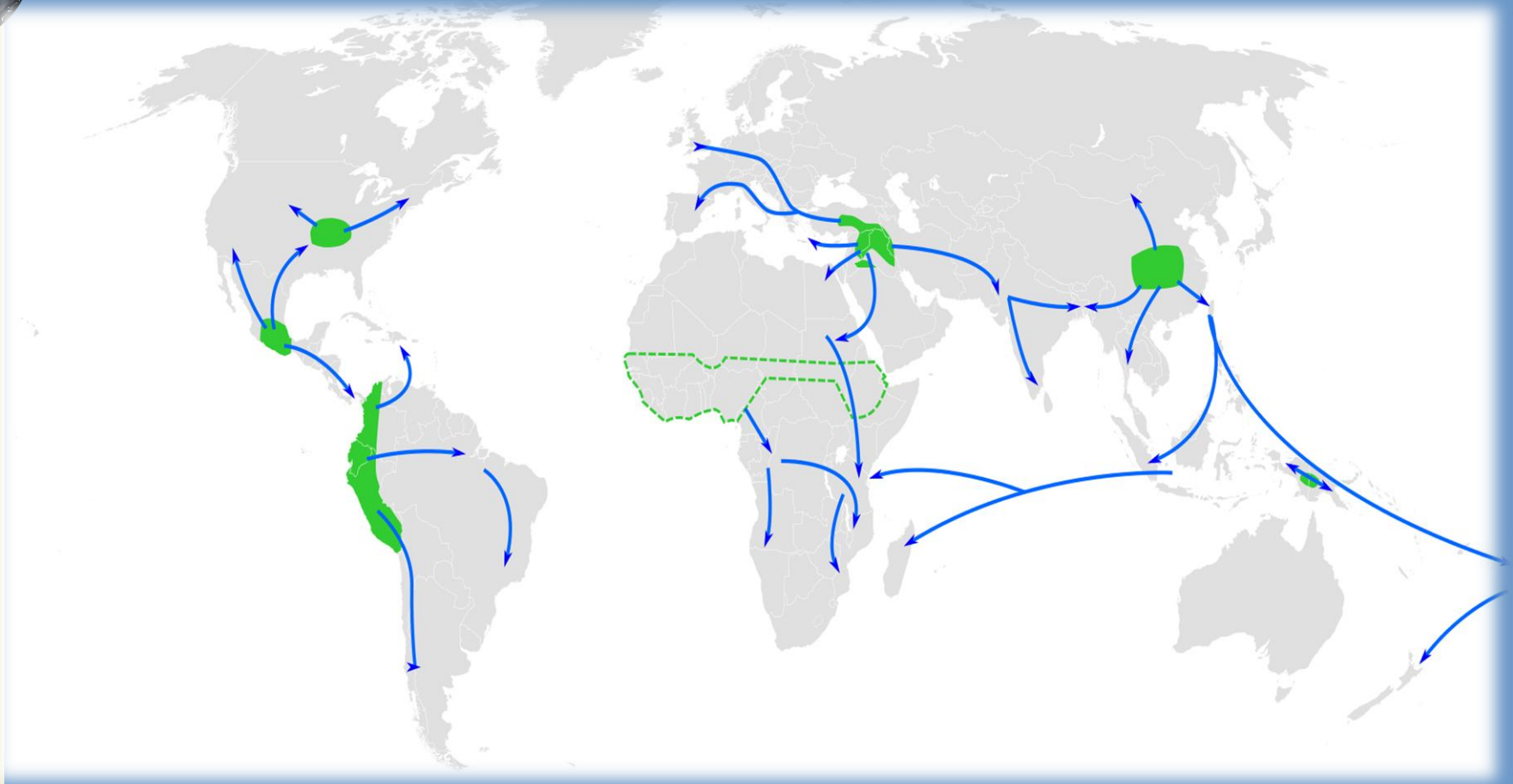
Around 8,000 years ago a new way of providing food emerged. This revolutionary advancement was that of farming. Instead of hunting and gathering food from the environments where they lived, humans learned to simply grow their own food. Grains such as wheat, barley, rice and corn were grown in different parts of the world. People also tamed animals.

The move to settled farming is known as the Agricultural Revolution. An increased supply of food made it possible for people to settle in villages and engage in jobs other than farming.

The Agricultural (Neolithic) Revolution



The Agricultural (Neolithic) Revolution

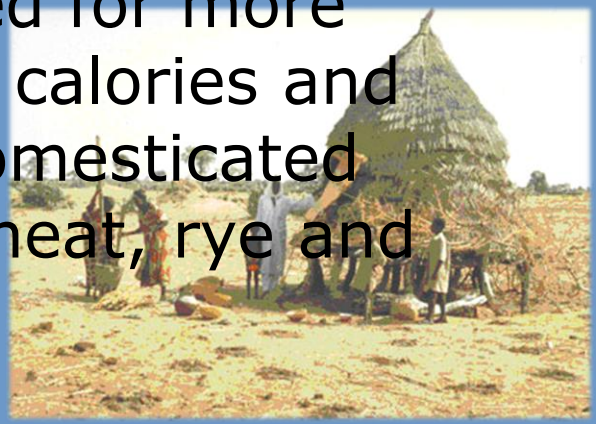


approximate centers of origin of agriculture and its spread in prehistory

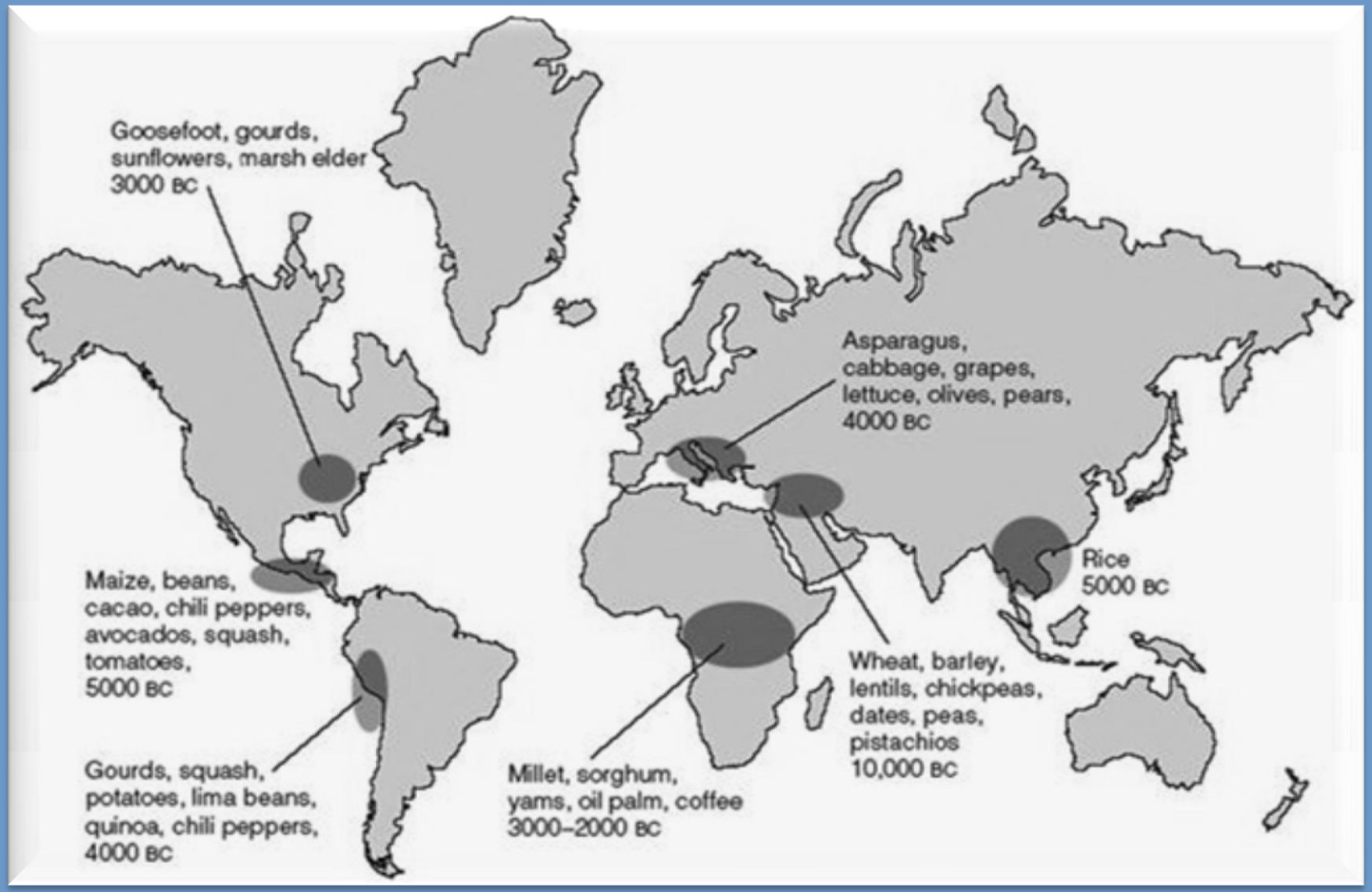
The Agricultural (Neolithic) Revolution

Domestication of Plants

- seed agriculture: Fertile Crescent, western India, northern China, Ethiopia, southern Mexico (11,000 bp)
- vegetative planting: Southeast Asia, West Africa, Northwest South America (3,000-5,000 bp)
- Rice, wheat and corn accounted for more than 50% of population's food calories and were among the first plants domesticated (along with millet, sorghum wheat, rye and barley).



The Agricultural (Neolithic) Revolution



The Agricultural (Neolithic) Revolution

Domestication of Animals

- dog: probably first
- early domesticated animals: cattle, oxen, pig, sheep, goat, guinea pig, llama
- vital role of domesticated animals in increase in and success of agricultural production and its environmental impact
- relationship of agriculture and domesticated animals to success of particular cultures and languages ... Example: Indo-European horsemen

The Agricultural (Neolithic) Revolution


urbanization: Jericho

- Primary effects:
  - urbanization
  - social stratification
  - occupational specialization
  - increased population densities
- Secondary effects:
  - endemic diseases (ongoing in a specific place or people)
  - famine
  - expansionism

Human Expansion and Ancient Agricultural Empires

- Urbanization and increased efficiency lead to population growth and increased density, which leads to need for more space.
- Ancient Examples:
  - Aztecs and Maya
  - Chinese Warlords and Dynasties
  - Polynesians
  - Roman Empire
  - Muslim and Ottoman Empires
- Human and environmental costs are inevitable.

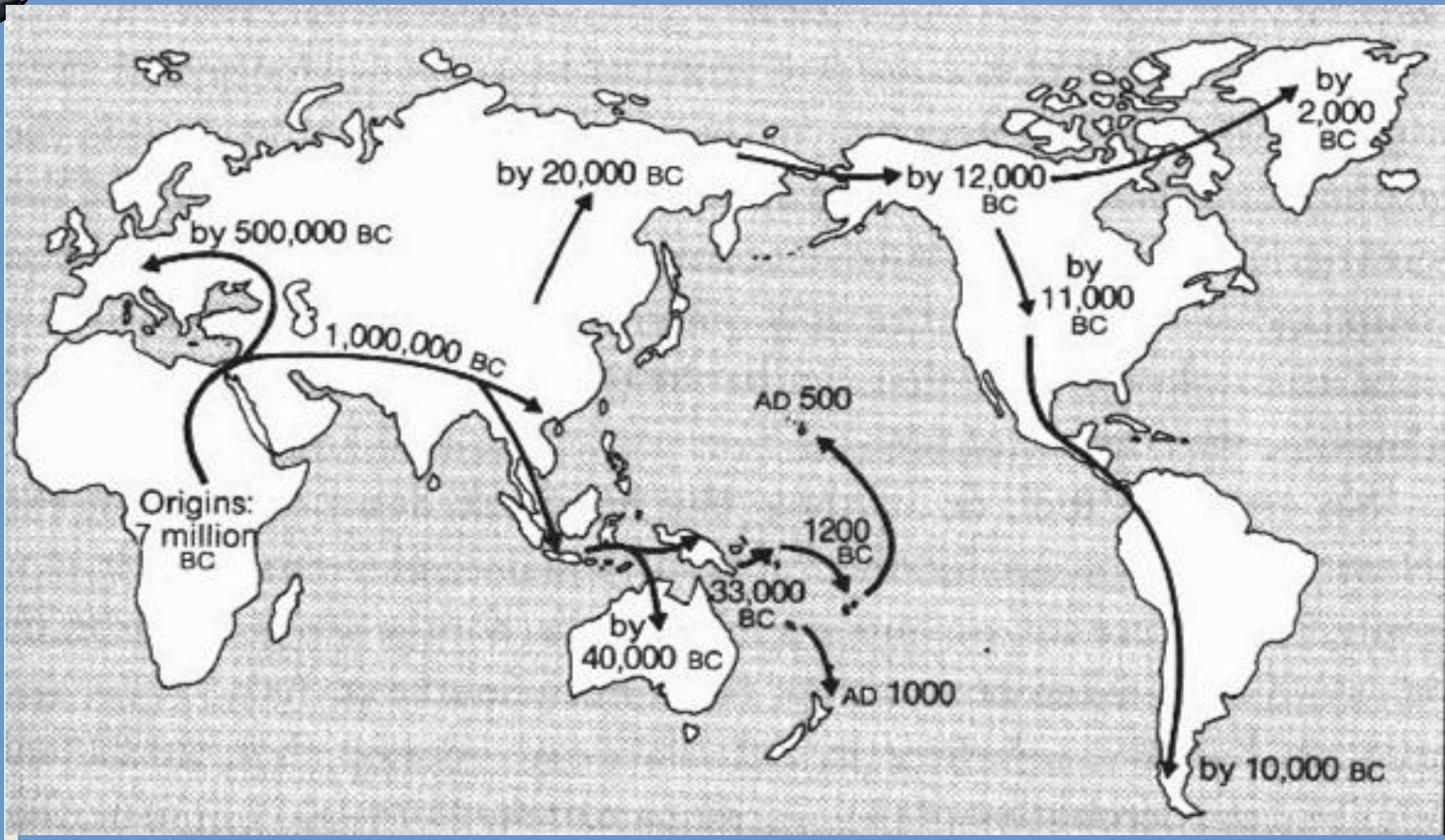
Natural Experiments in Environmental Studies

Successful cultures are those that adapt well to their environments. Many have not: Chaco Canyon, North Africa, Fertile Crescent, Easter Island.

Chaco Canyon, New Mexico

Easter Island, Polynesia

Human Expansion

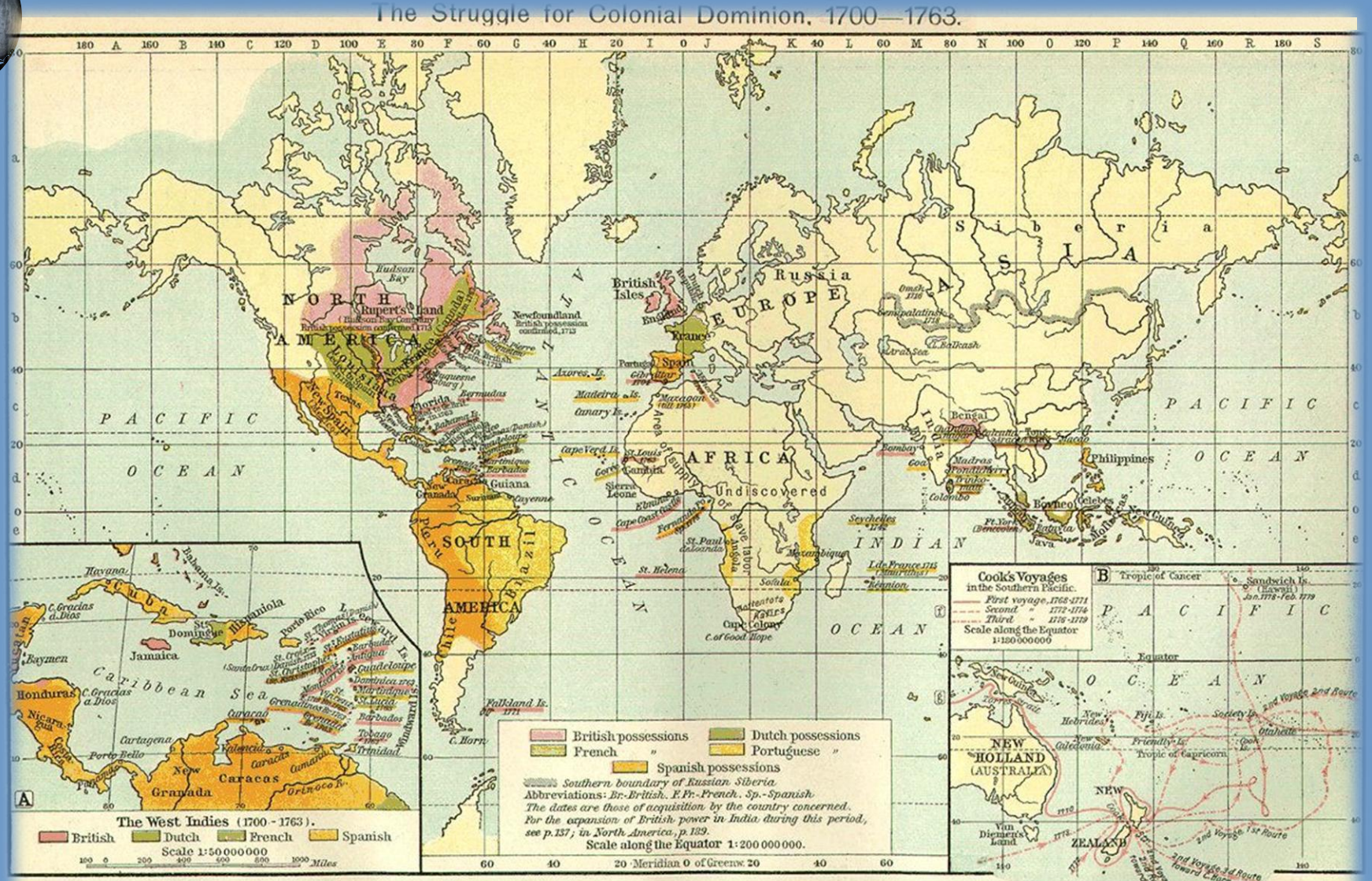


Age of European Discovery, Exploration and Colonization

1492 - 1771

- Bartholomew Dias (Portugal), 1488: rounded Cape of Good Hope
- Columbus (Spanish/Italian), 1492: first of four voyages to the new world
- Vasco De Gama (Portugal), 1498: reached India
- Magellan (Portugal), 1519: first circumnavigation
- James Cook (England), 1768-1771: voyages in Pacific and Polynesia, end of Era of Discovery

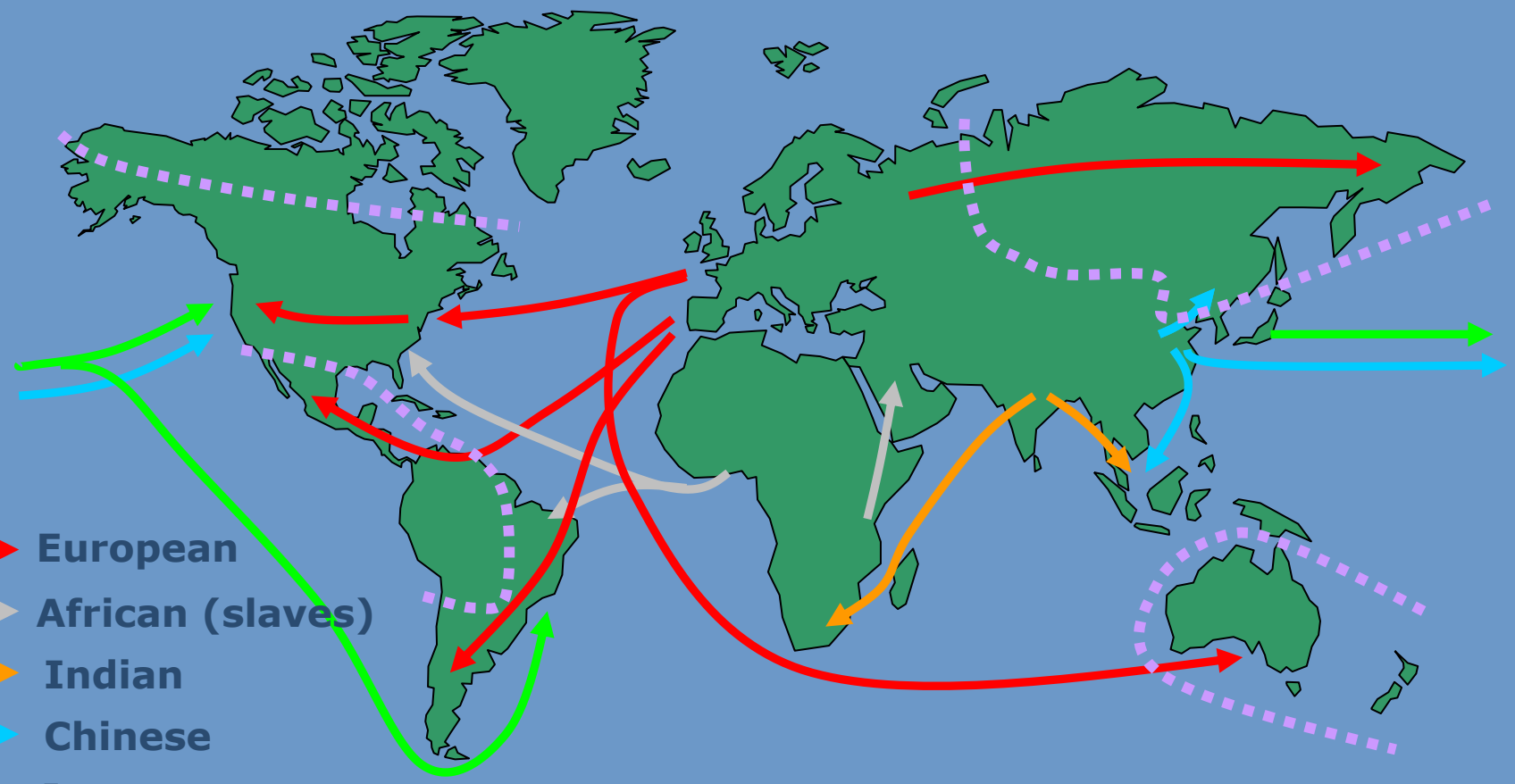
Struggle for Colonial Dominion, 1700-1763



Captain James Cook

The geographic knowledge acquired was crucial to the expansion of European political and economic power in the 16th century.

World Migration Routes Since 1700



European

African (slaves)

Indian

Chinese

Japanese

majority pop descended from immigrants

Industrial Revolution

The Industrial Revolution was the process of change from an agrarian, handicraft economy to one dominated by industry and machine manufacture from about 1760 to sometime between 1820 and 1840.

Machines changed people's way of life as well as their methods of manufacture. The Industrial Revolution marked a major turning point in history. Almost every aspect of daily life was influenced in some way. In particular, average income and population began to exhibit unprecedented sustained growth. Some economists say that the major impact of the Industrial Revolution was that the standard of living for the general population began to increase consistently for the first time in history.

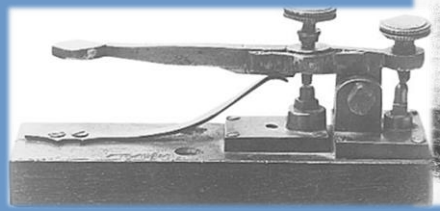
Turning Points in History: The Industrial Revolution

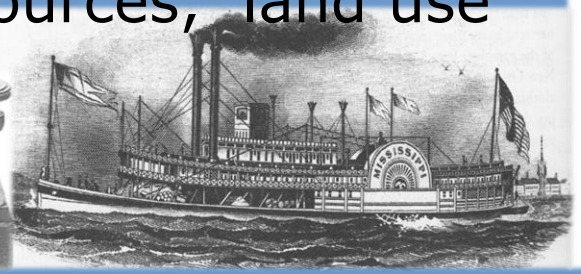
Industrial Revolution

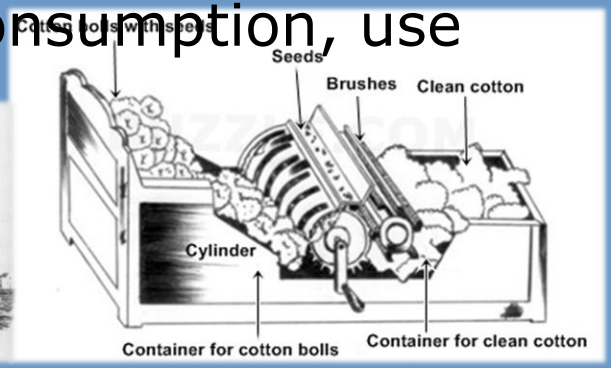
- ...began in Britain in the 18th century and from there spread to other parts of the world
- ...from 1760 to 1830 largely confined to Britain
- British government forbade the export of machinery, skilled workers and manufacturing techniques.
- Why did the Industrial Revolution begin In England?
  - natural resources such as coal, iron ore and developed farmlands
  - new technologies such as the steam engine and textile machines
  - population growth due to previous agricultural boom
  - business class risked capital to start new ventures
  - empire held land worldwide so had overseas markets
  - stable government

Industrial Revolution

- Belt of industrial cities formed an economic core based on fossil fuel consumption.
- 1733: 1st cotton mill opened in England
- 1793: Eli Whitney invented cotton gin
- 1800: steam engines became common (steamboats, locomotives)
- 1837: Morse and two Brits (independent of Morse) invented telegraph
- 1908: Henry Ford delivered first Model T
- environmental effects: energy consumption, use of natural resources, land use







Industrial Revolution

Important Terminology

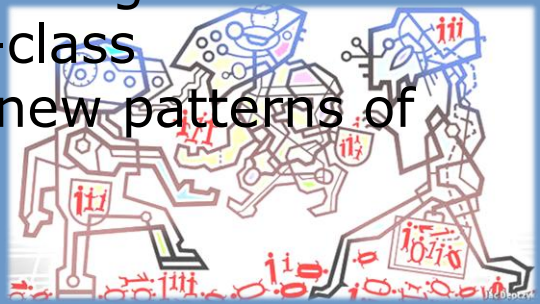
- industrialization: shift from an agricultural economy (farming) to one based on industry (manufacturing)
- manufacturing: use of machines, tools and labor to make things for use or sale
- rural: farming or country life, villages (sparsely populated)
- urban: city life (densely populated)
- urbanization: the movement of people to cities
- free market: market in which there is no economic intervention and regulation by the state

Industrial Revolution

- Technological changes included the following:
  - a new organization of work known as the factory system, which entailed division of labor and specialization of function
  - important developments in transportation and communication, including the steam locomotive, steamship, automobile, airplane, telegraph and radio
  - the increasing application of science to industry
- These technological changes made possible a tremendously increased use of natural resources and the mass production of manufactured goods.

Industrial Revolution

- Socioeconomic changes included the following:
  - agricultural improvements that made possible the provision of food for a nonagricultural population
  - economic changes that resulted in a wider distribution of wealth, the decline of land as a source of wealth in the face of rising industrial production and increased international trade
  - political changes reflecting the shift in economic power, as well as new state policies corresponding to the needs of an industrialized society
  - sweeping social changes, including the growth of cities, the development of working-class movements and the emergence of new patterns of authority

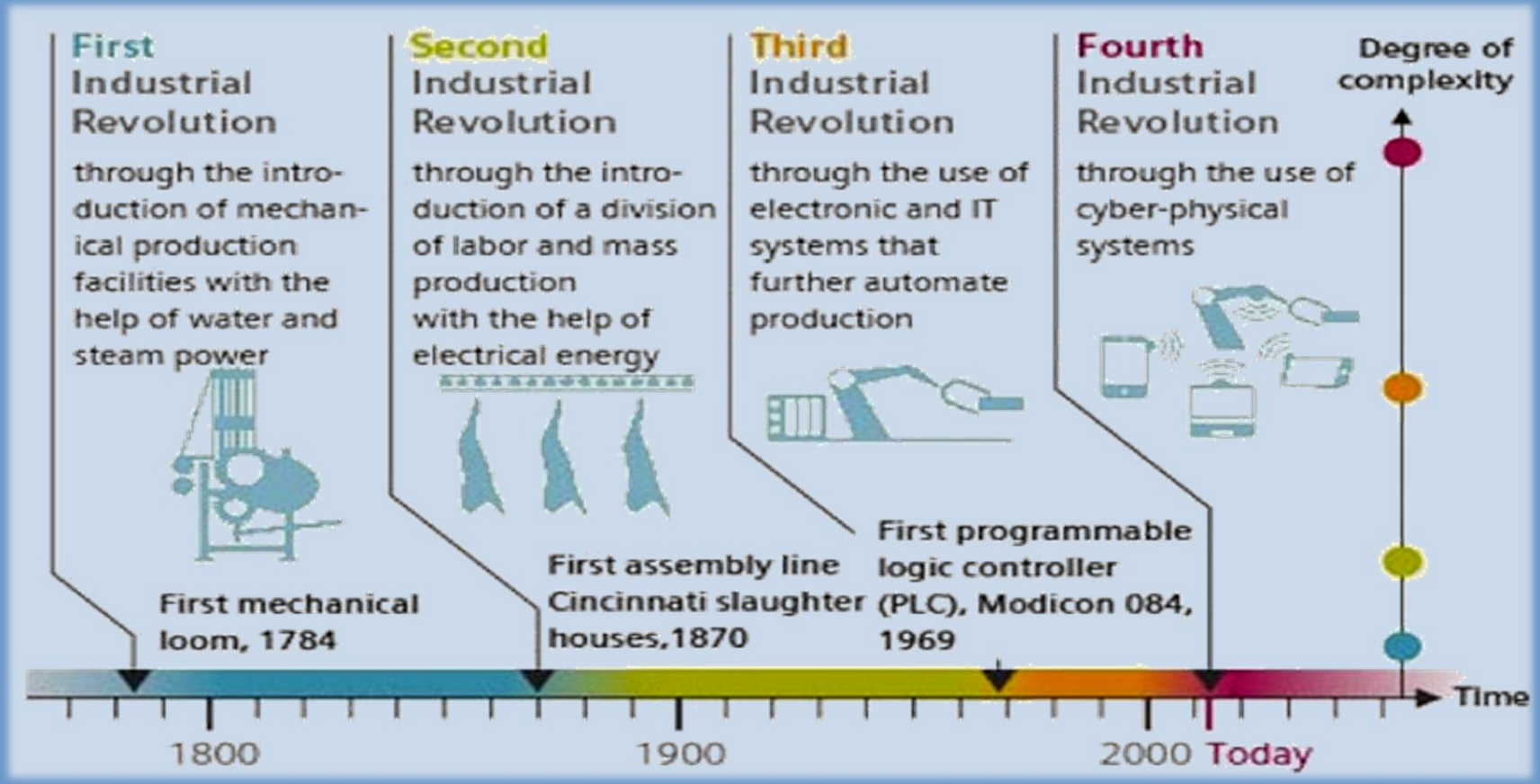


Industrial Revolution

- Cultural transformations of a broad order included the following:
  - workers acquired new and distinctive skills
  - relation to tasks shifted: no longer craftsmen working with hand tools, became machine operators subject to factory discipline
  - psychological change: heightened confidence in the ability to use resources and to master nature

Industrial Revolution

The Industrial Revolution has actually been several revolutions.



Global Communications and Transportation Revolution

Technology:

- containerization of cargo (1950s)
- inexpensive international air transport (1960s - present)
- internet and earlier arpanet (1960s)
- personal computer (1980s)
- satellite communications (1990s)
- globalization of economies and rise of transnational corporations

Globalization

...the increasing interconnectedness of different parts of the world through common processes of economic, political and cultural change

The economic, cultural and environmental effects of globalization are highly contested.

Nearly everything moves farther and more quickly today: innovations, diseases, people, ideologies, financial crises, information.

Panama, 1997

Transnational Corporations

Name	Industry	Revenue (USD billions)	Year
Wal-Mart Stores	retail	$482	2015
Samsung	conglomerate	$305	2014
Royal Dutch Shell	oil and gas	$273	2015
ExxonMobil	oil and gas	$268	2015
Volkswagen	automotive	$245	2014
Apple	electronics	$234	2015
Toyota	automotive	$227	2015
BP	oil and gas	$223	2015
Phillips 66	oil and gas	$161	2014
Daimler	automotive	$157	2014
General Motors	automotive	$152	2015
General Electric	conglomerate	$149	2014
Ford Motor Co	automotive	$144	2014
Honda	automotive	$142	2014
CVS Health	retail	$139	2014

These companies conduct business in many states, moving products and capital rapidly across national borders.

The Next Revolution

What emerging technologies will change the world? Which parts of the world stand poised to capitalize on them?

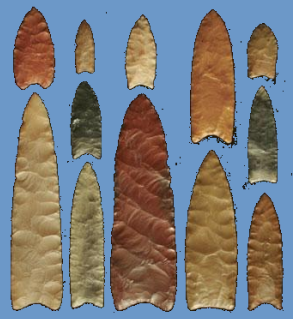
- genetic engineering
- biotechnology
- artificial intelligence
- robotics and micro-robotics
- nanotechnology

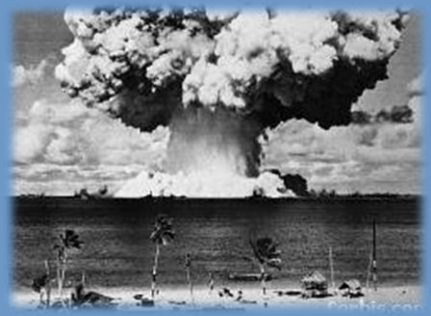
Navigating the Next Revolution

Revolution	Year	Information
1	1784	Steam, water, mechanical production equipment
2	1870	Division of labour, electricity, mass production
3	1969	Electronics, IT, automated production
4	?	Cyber-physical systems

Human Impact on the Planet

- There has been a dramatic increase in:
- individual energy use over time
- the power of technology to change the environment: think stone axe versus bulldozer versus atomic bomb
- the scope and severity of environmental impacts





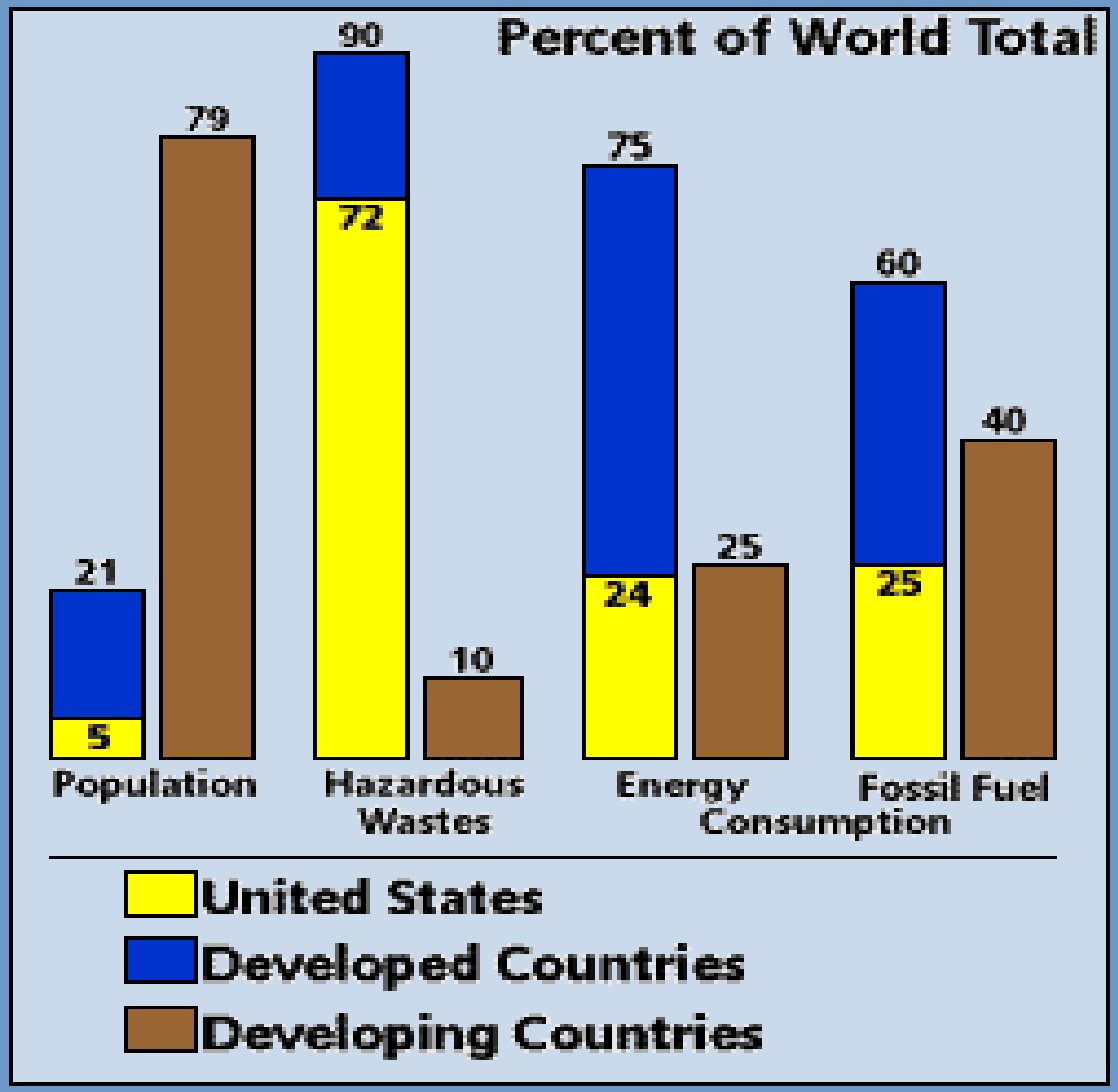
Human Impact on the Planet

- The carrying capacity of a biological species in an environment is the population size of the species that the environment can sustain indefinitely, given the food, habitat, water and other necessities available in the environment. For the human population, more complex variables such as sanitation and medical care are sometimes considered as part of the necessary infrastructure.
- The ecological footprint is a measure of human demand on the Earth's ecosystem. It compares human demand with the Earth's ecological capacity to regenerate. It represents the amount of biologically productive land and sea area needed to regenerate the resources a human population consumes and to absorb and render harmless the corresponding waste.

Human Impact on the Planet

- Sustainable development is the ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Sustainable development involves a triple bottom line: the simultaneous pursuit of economic prosperity, environmental quality and social equity.

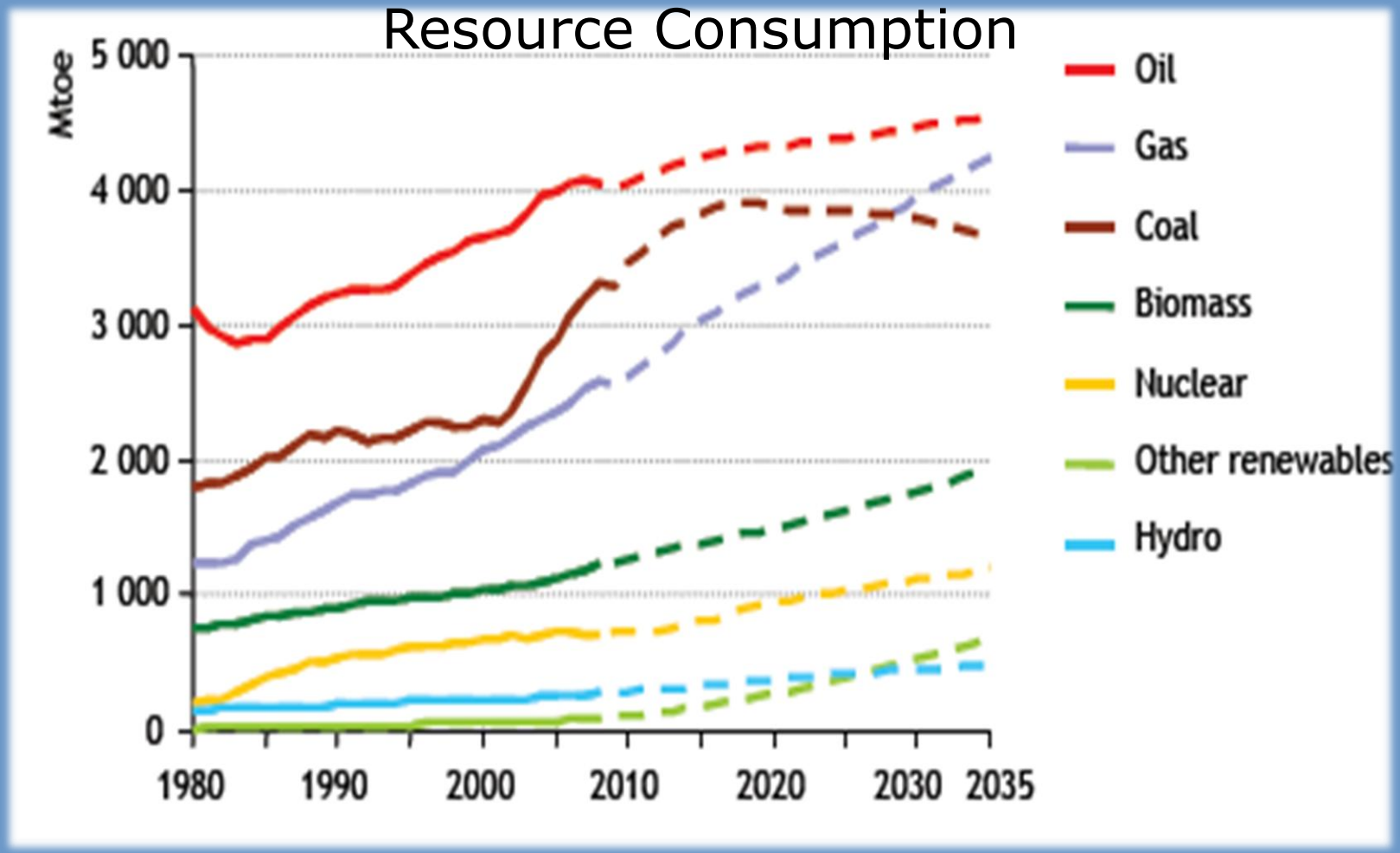
Human Impact on the Planet



$$I = P \times A \times T$$

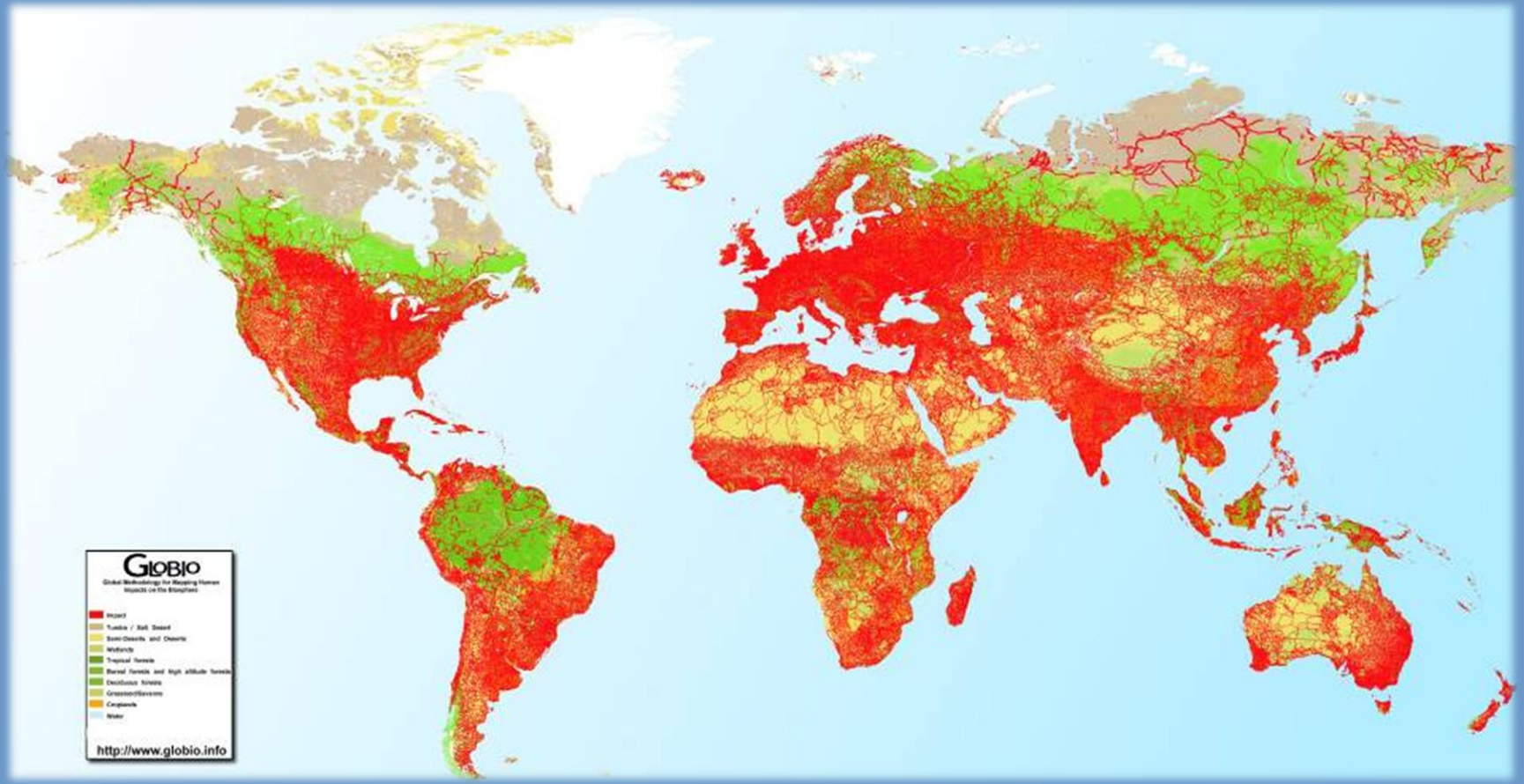
Impact = Population X Affluence X Technology

Human Impact on the Planet



Human Impact on the Planet

Red represents roads, power lines, major landscape change (eg, agriculture), pipelines and urbanized areas.



Human Impact on the Planet

- Agricultural and industrial societies accelerated extinctions.
  - flightless birds, whales, otters
  - US Passenger Pigeon
  - Dodo bird, discovered in 1598, extinct by 1681


Dodo bird, Mauritius, Indian Ocean

Human Impact on the Planet

Humans have altered the face of the Earth more than any other species, and the pace of change is increasing. Our transformations go back at least to the beginnings of agriculture more than 10,000 years ago. Over the centuries, population growth and improved transportation have driven humans to control ever-widening tracts of land.

We're not the only animals that shape their surroundings. All creatures remake their environments to suit their purposes. But no species has been as thorough or as global about it as humans.

Human Impact on the Planet

Humans' impact on Earth is not always harmful. Parks, farmlands and wilderness areas allow human use while preserving natural habitats. But our role in shaping the Earth is powerful, and the human footprint continues to expand.

The End