HUMAN POPULATION

History Growth Rate Age structures Supply & Demand

What is the current human population?

7 billion

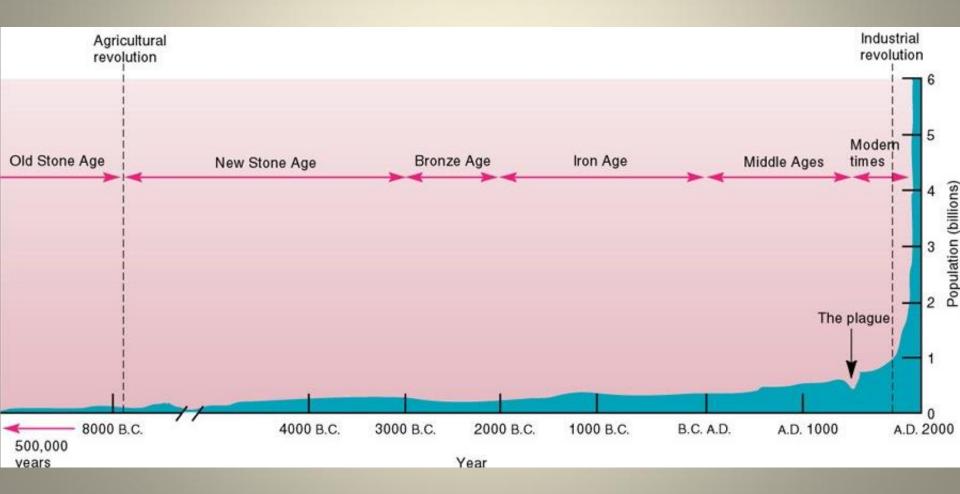
Activity: Brainstorm

- As the human population grew, how did we avoid the problems with density-dependent factors, which limit population growth?
- First, recall the list of density-dependent factors

History

- Reduced competition for space by expanding geographic range due to ability to live in harsher climates
- Reduced competition for food by shifting from hunting and gathering to agriculture and then to industrialization
- Reduced effect of disease with advances in public health (e.g. health care, medicine and the sewage system) which had major impacts on malnutrition, infection and hygiene
- Improved ability to defend (weaponry)

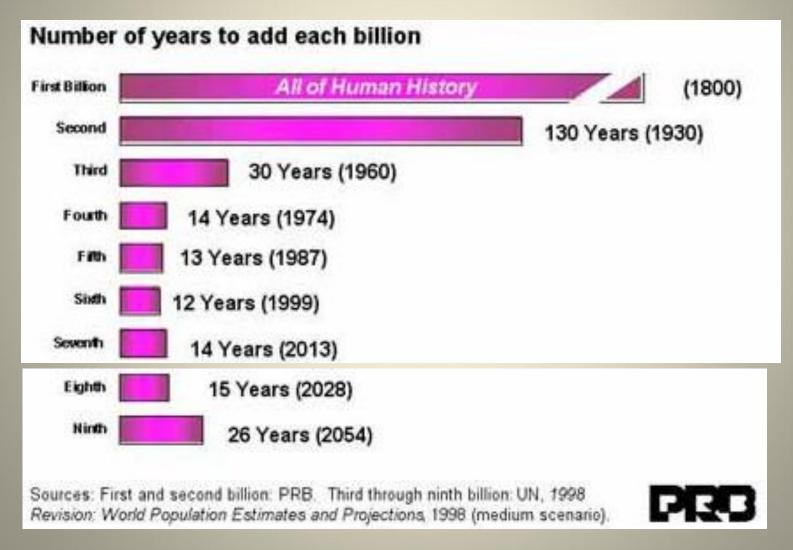
History of the World Population



Implications on Population

Occurrence	Positive impact	Negative implications	
Domestication of animals			
Agricultural revolution			
Industrial revolution			

Doubling Time



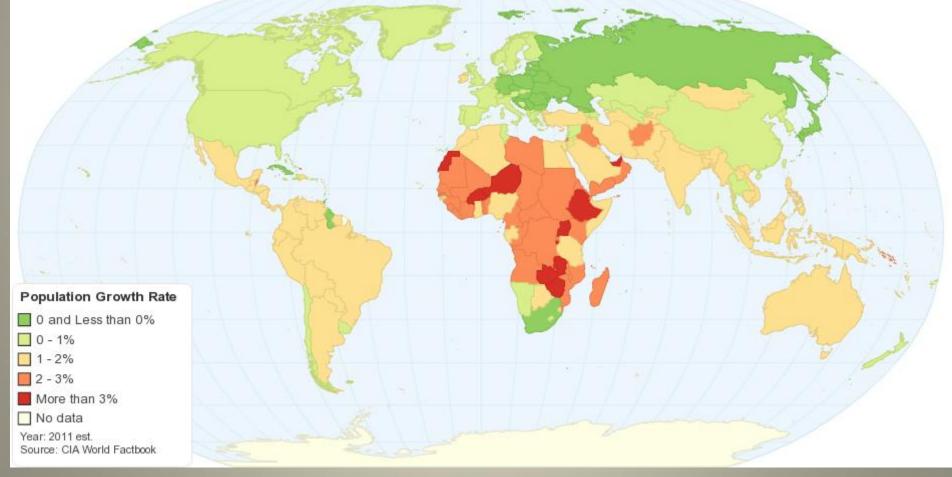
g.uwyo.edu/media/population/diagrams/doublingTime.jpg

Video: Human Demography

<u>http://www.youtube.com/watch?v=2vr44C_G</u>
 <u>0-0</u> (43:22)

Growth Rate

Average percent increase in population (2011)



Worldwide Distribution of Population Growth

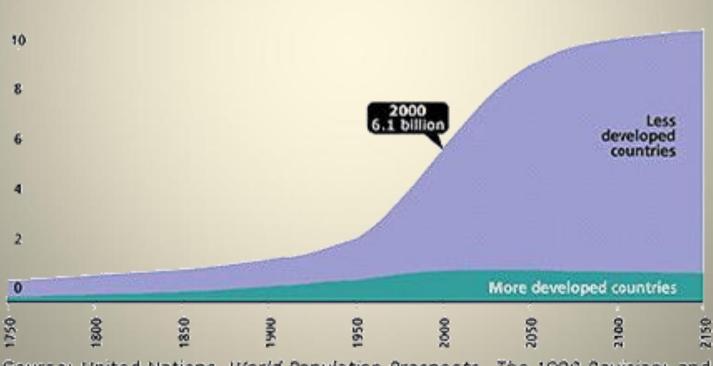
The World Health Organization estimates that one third of the world is well-fed, one third is starving. By 2658 that number could be significantly larger when the world's population is expected to reach a whopping 9 billion. The world's driest regions in Northern Africa and the Hiddle East are also the fastest growing, putting them at a an especially high risk of furthering the food crisis.

WORLD POPULATION GROWTH FROM 2008 TO 2050

Population Growth

• What major factor is contributing to countries that have high population growth?

Population (in billions)

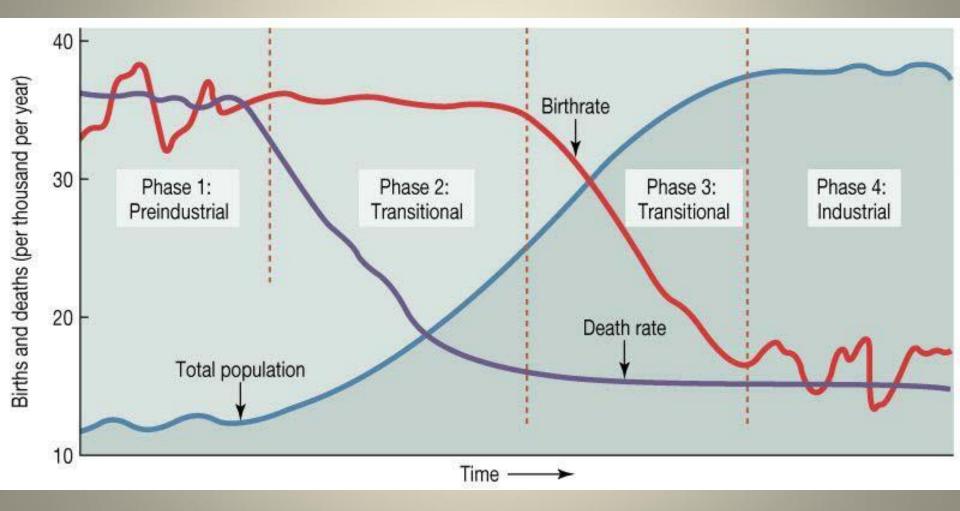


Source: United Nations, World Population Prospects, The 1998 Revision; and estimates by the Population Reference Bureau.

Demographic Transition Model

- Model describes historical changes in demographic patterns (birth & death rates) as a country passes through through 4 stages of economic development
- Looks at the trends in the relationship between a country's population growth and its economic development

Demographic Transition Model

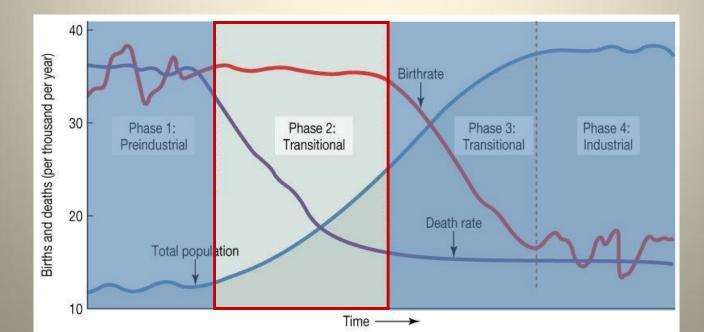


Stage	1 High stationary	2 Early expanding	3 Late expanding	4 Low stationary	5? Declining?
40- 30- Birth and death rates 20- (per 1000 people per year) 10-	Death rate	Birth rate	Natural increase	ZPG react	Natural decrease ?
Examples	A few remote groups	Egypt, Kenya, India	Brazil	USA, Japan France, UK	Germany
Birth rate	High	High	Falling	Low	Very low
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable or slow increase	Very rapid increase	Increase slows down	Stable or slow increase	Slow decrease
Reasons for changes in birth rate	Many children needed for farming. Many children die at an early age. Religious/social encouragement. No family planning.		Improved medical care and diet. Fewer children needed.	Family planning. Good health. Improving status of women. Later marriages.	
Reasons for changes in death rate	Disease, famine. Poor medical knowledge so many children die.	Improvements in medical care, water supply and sanitation. Fewer children die.		Good health care. Reliable food supply.	

Demographic Transition Model

Developing countries often stuck in stage 2:

- Not enough skilled workers or capital to make the transition to industrial stage
- Decline in death rate without a decline in birth rate
- Results in rapid population growth



Replacement Rate

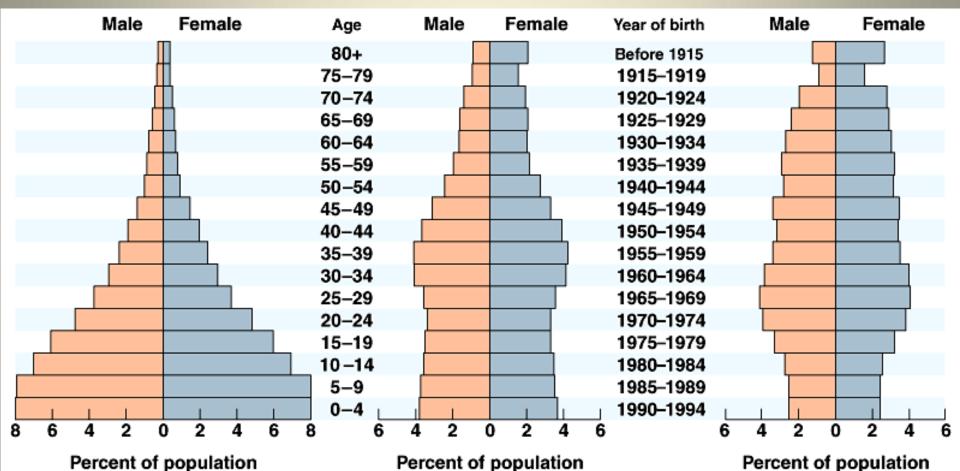
- Rate at which people have children to replace them when they die
- Slightly higher than 2 children per couple:
 - Some female children die before reaching reproductive age or do not have children
 - Current rate: 2.5 in less industrialized countries,
 2.1 in more industrialized countries

Population Pyramids

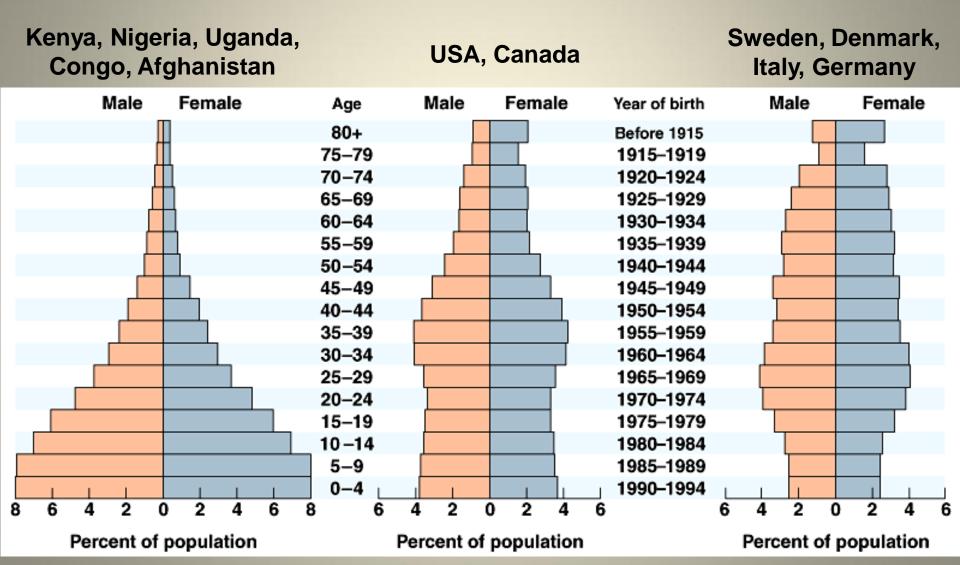
Rapid Growth

No / Zero Growth

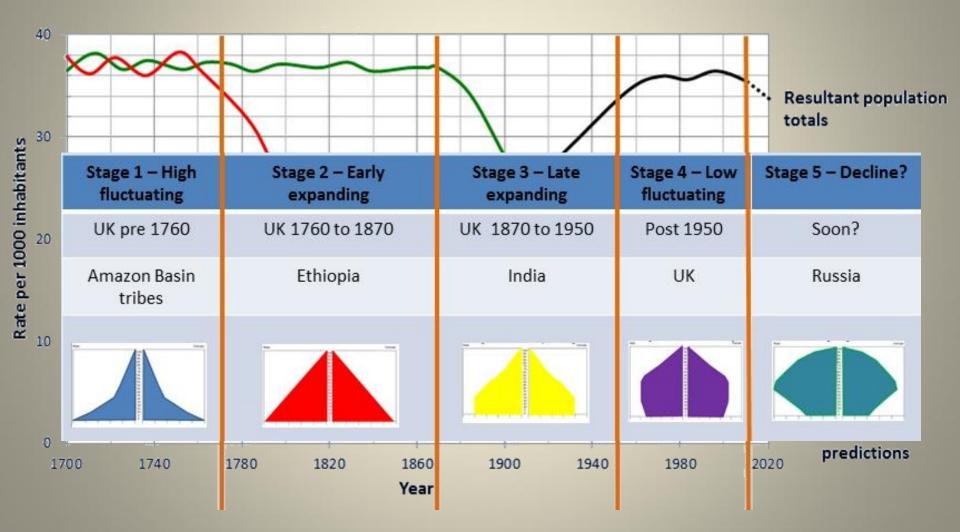
Negative / Declining Growth



Population Pyramids



Population Pyramids and Demographic Transition Model



Ecological Footprint: Demand

- Total amount of land needed to support one person
 - Estimated average of 2 hectares per person globally (1 hectare = 10,000 m²)
- Some data:
 - 20% of world's population (wealthy) consumes 86% of world's resources and produces 53% of the world's CO2 emissions
 - People in the poorest countries use 1.3% of the world's resources and produce 3% CO2

Ecological Footprint around the World

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North America

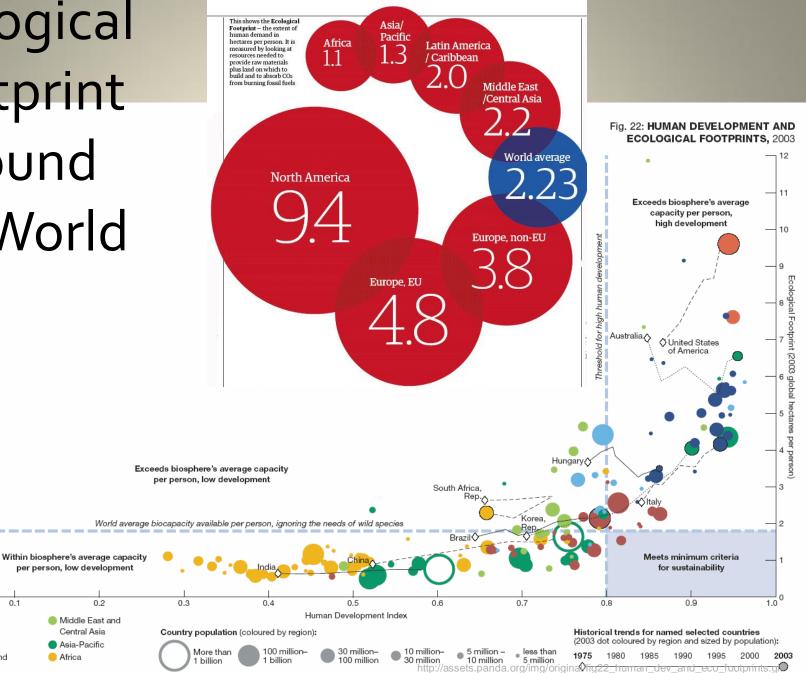
Europe Non-EU

Latin America and

the Caribbean

Europe EU

0.1



Brainstorm ways to reduce ecological footprint

- Reduce carbon output:
 - Transportation: Walk instead of drive
 - Energy consumption: Turn off lights
- Reduce food footprint:
 - Purchase locally grown produce
 - eat less meat
 - Avoid the use of pesticides
- Adopt water-saving habits:
 - take shorter showers
- Buy sustainable materials
- Use less. Buy less.

Reference: http://www.myfootprint.org/en/take_action/reduce_your_footprint/

Biocapacity: Supply

- Earth's carrying capacity for the human population
- Capacity of land available to meet human needs
- Estimated at ¼ of Earth's surface (11 billion ha)
- Low-productivity areas (e.g. deserts, open oceans) are not included

Supply and Demand

• Does the Earth's biocapacity support the world's ecological footprint?

• Data:

- 1961: ecological demand was 50% of biocapacity
- Mid-1980's demand surpassed supply
- 2002: demand exceeded biocapacity by 23%

Ecological Footprint less biocapacity (1961)

Footprint more than 150% larger than biocapacity Footprint 100-150% larger than biocapacity Footprint 50-100% larger than biocapacity Footprint 0-50% larger than biocapacity Biocapacity 0-50% larger than Footprint Biocapacity 50-100% larger than Footprint Biocapacity 100-150% larger than Footprint Biocapacity more than 150% larger than Footprint Insufficient data

Ecological Footprint less biocapacity (2007)

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Biocapacity 100-150% larger than Footprint Biocapacity more than 150% larger than Footprint

Insufficient data

Ecological Deficit

- Resource use and waste production that exceeds a sustainable level
- Data from Global Footprint Network:
 - Currently using an equivalent of 1.5 planets
 - It takes the Earth 1 year and 6 months to regenerate what is used in 1 year