

HUMAN POPULATION

History

Growth Rate

Age structures

Supply & Demand

What is the current human
population?

7 billion

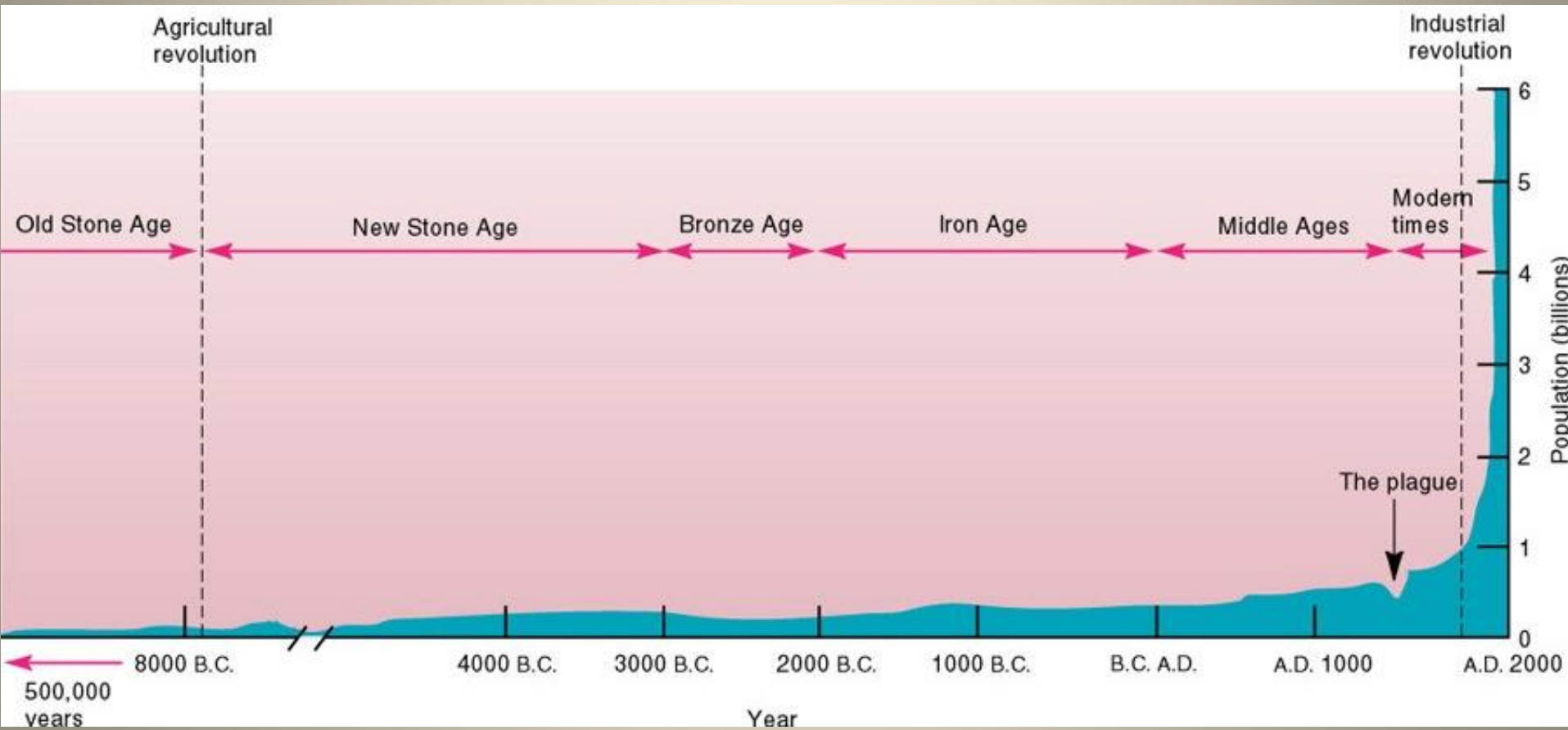
Activity: Brainstorm

- 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

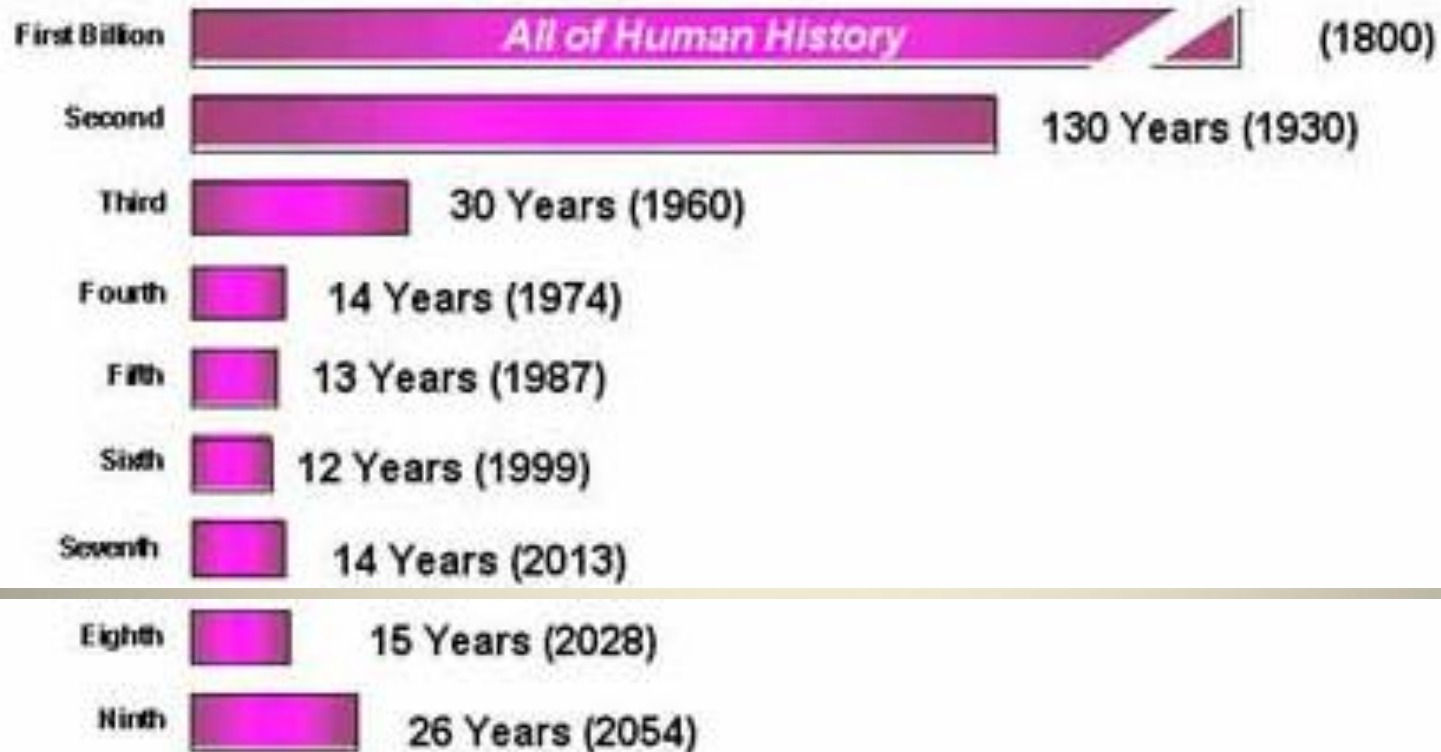


Implications on Population

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

Doubling Time

Number of years to add each billion



Sources: First and second billion: PRB. Third through ninth billion: UN, 1998
Revision: *World Population Estimates and Projections*, 1998 (medium scenario).

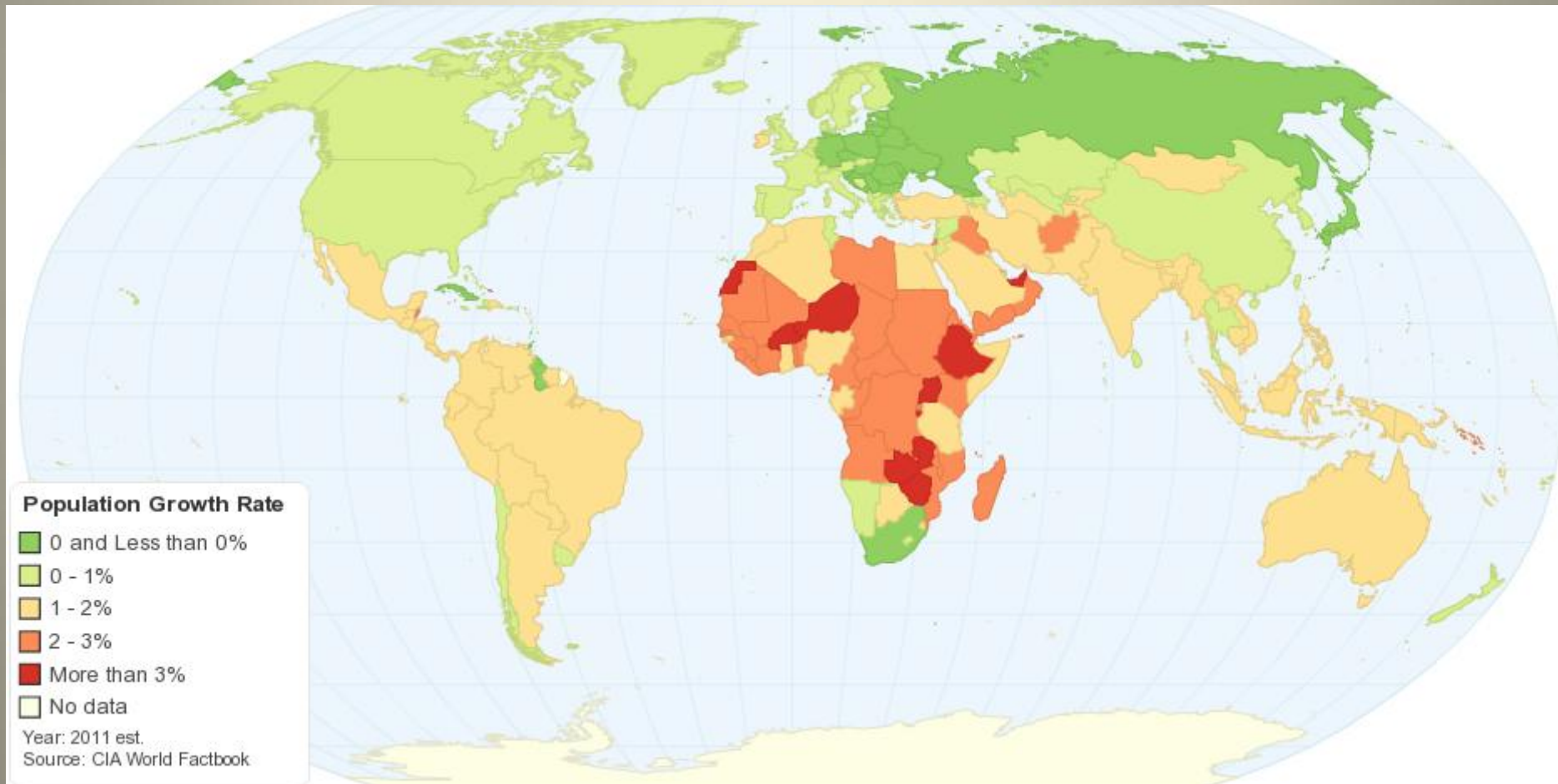


Video: Human Demography

- http://www.youtube.com/watch?v=2vr44C_Go-o (43:22)

Growth Rate

Average percent increase in population (2011)

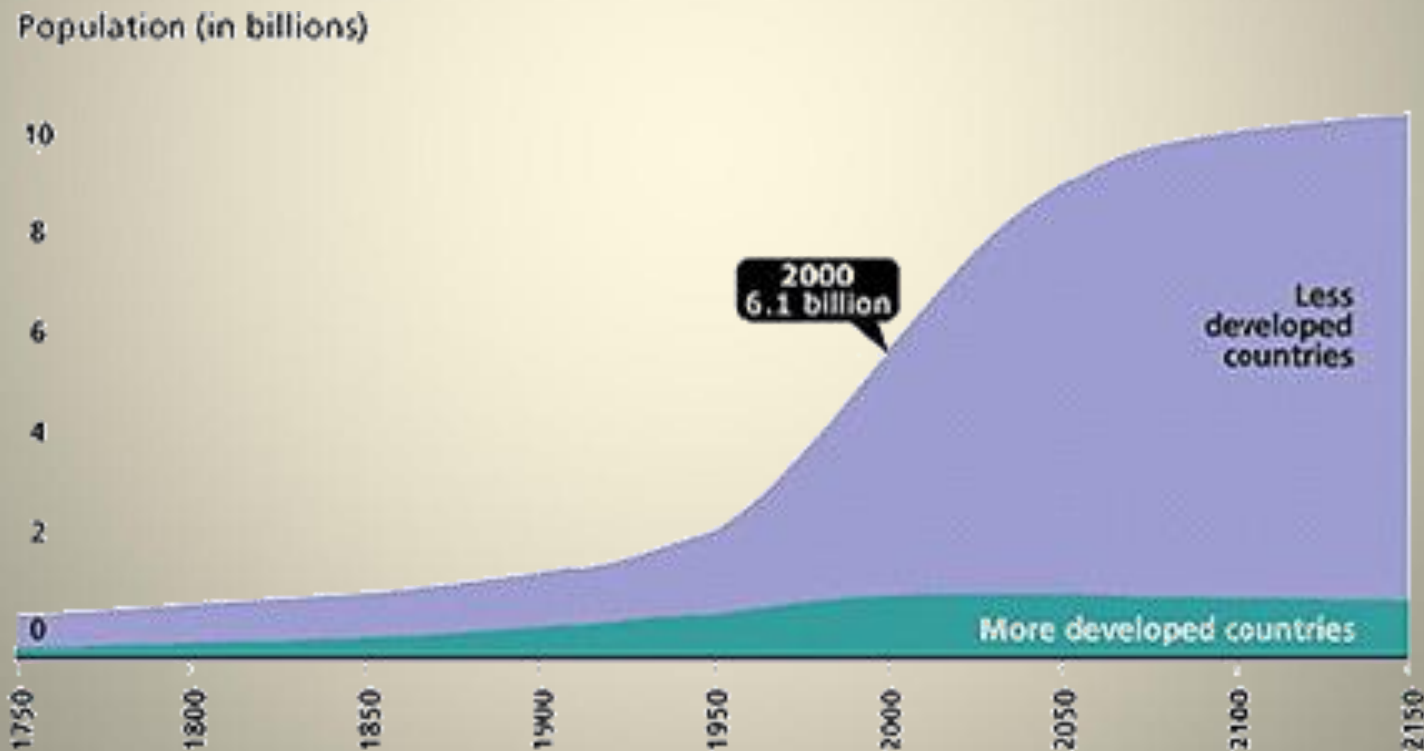


Worldwide Distribution of Population Growth



Population Growth

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

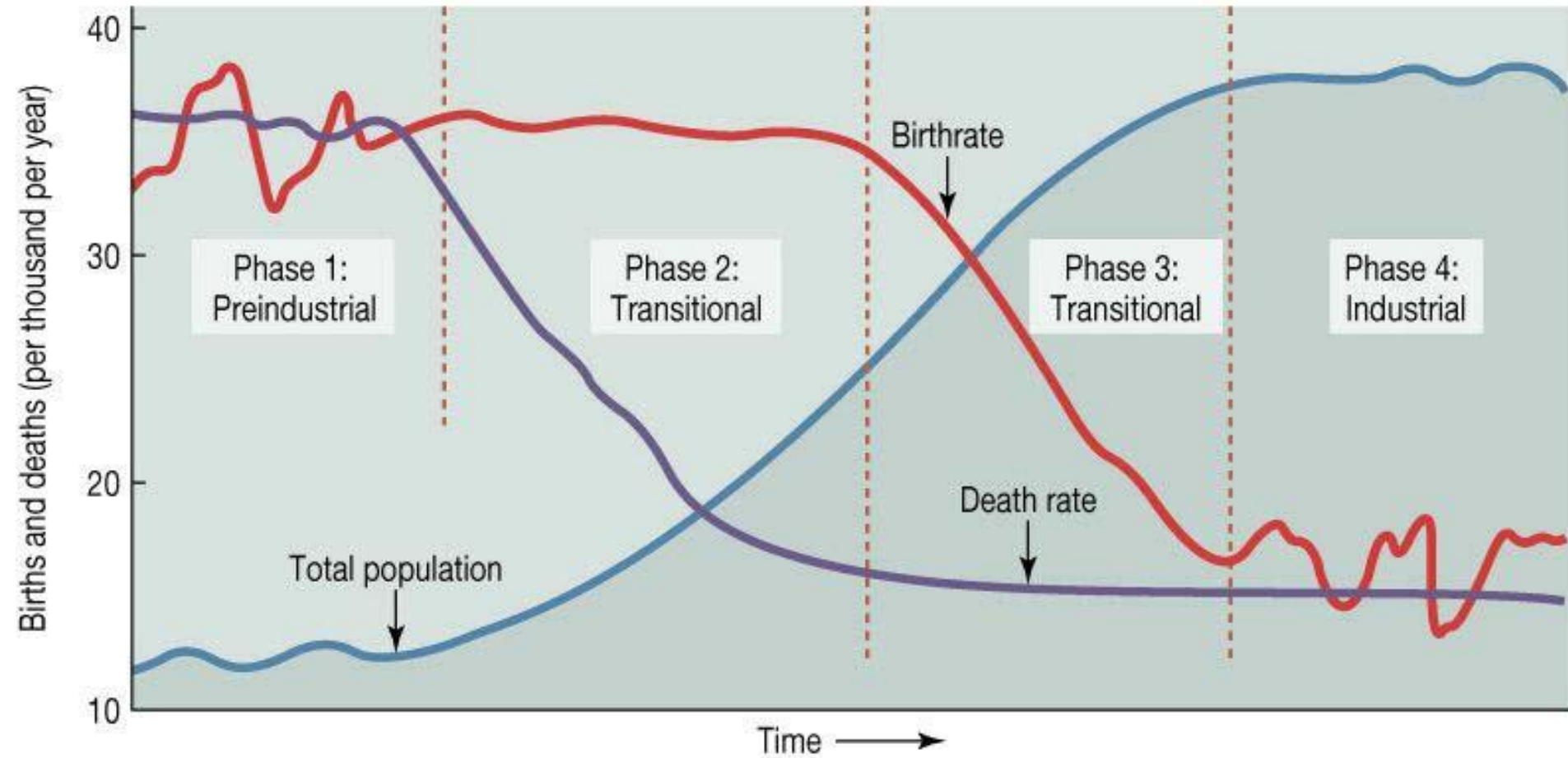


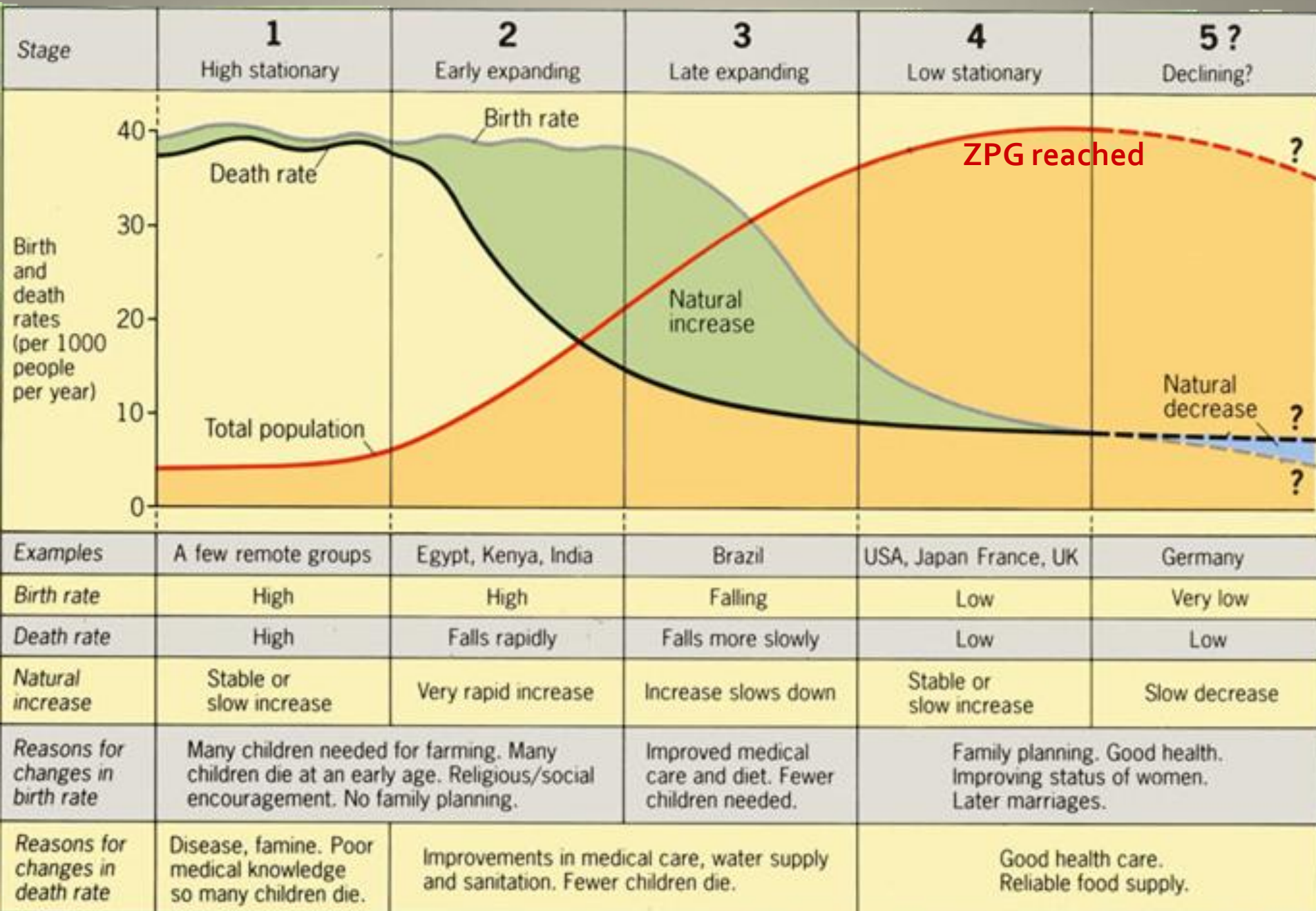
Source: United Nations, *World Population Prospects, The 1998 Revision*; and estimates by the Population Reference Bureau.

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

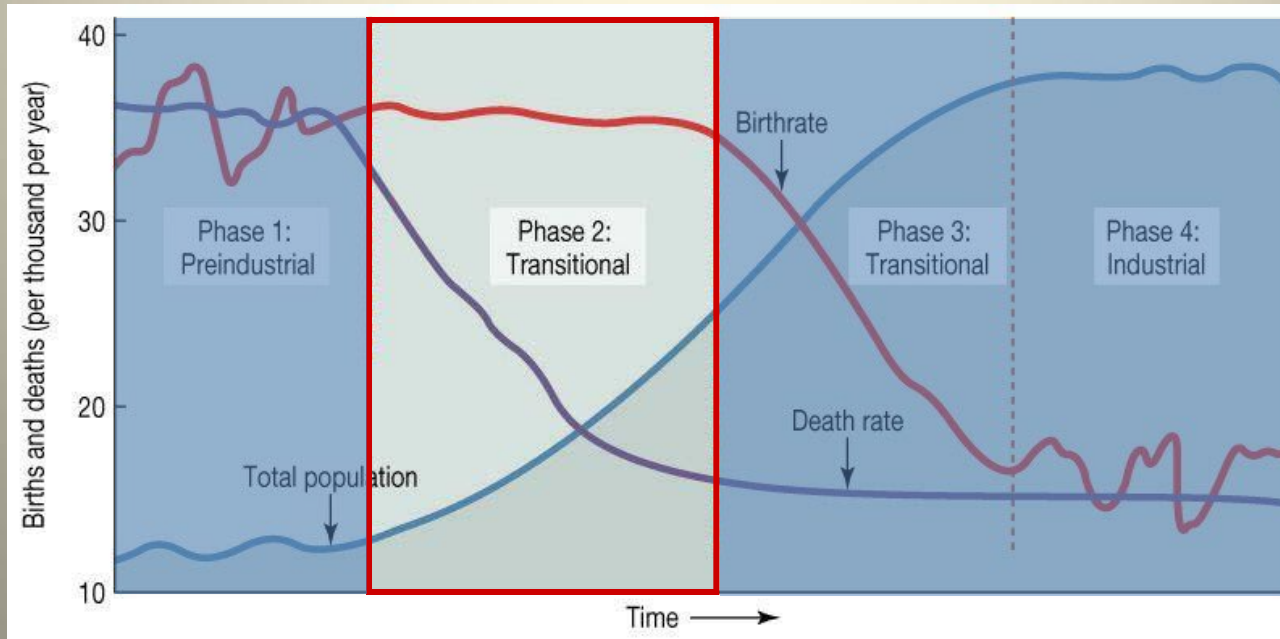




Demographic Transition Model

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

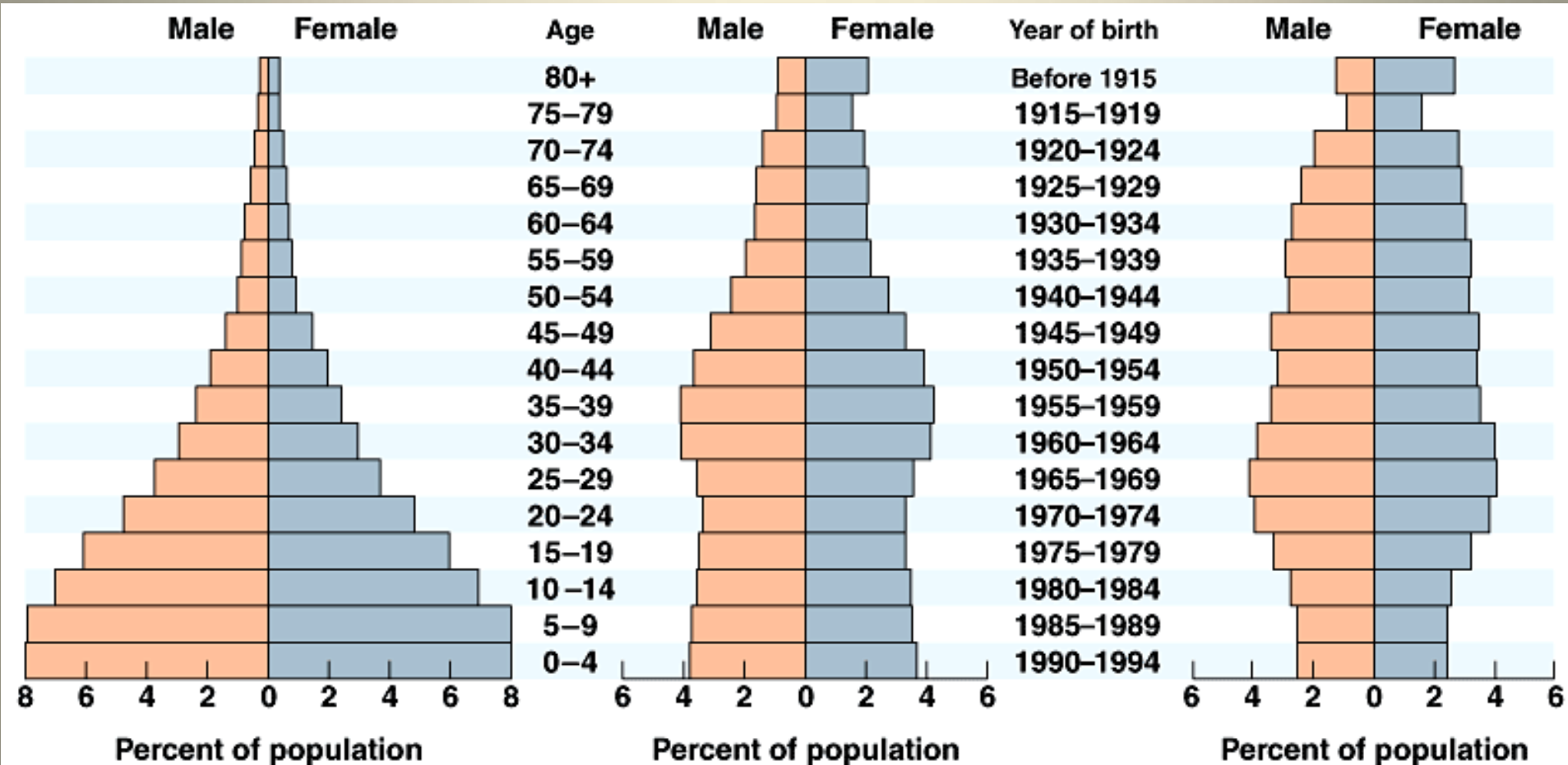
- Rate at which people have children to replace them when they die
- Slightly higher than 2 children per couple:
 - Some female children die before reaching reproductive age or do not have children
 - Current rate: 2.5 in less industrialized countries, 2.1 in more industrialized countries

Population Pyramids

Rapid Growth

No / Zero Growth

Negative / Declining Growth

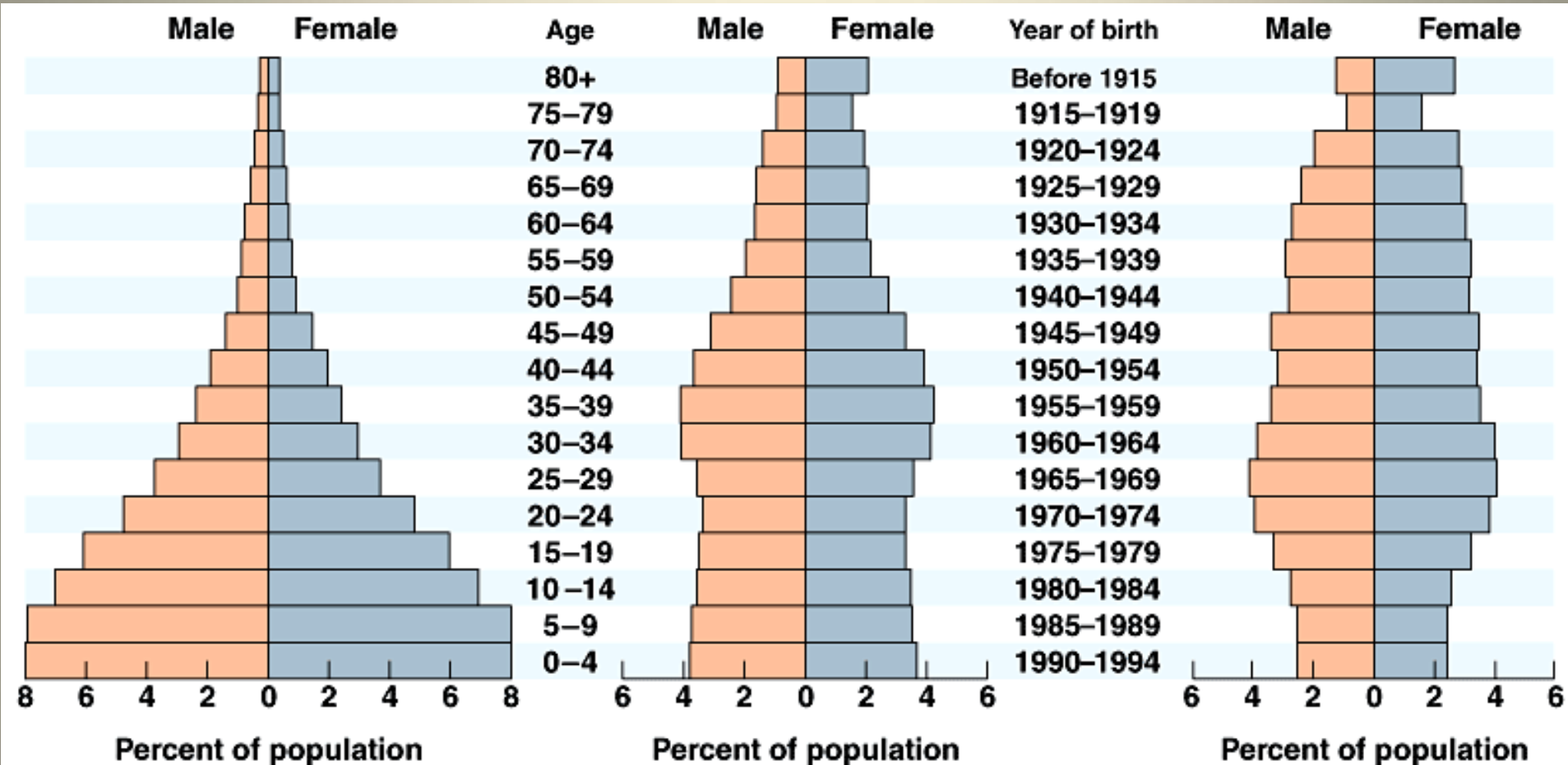


Population Pyramids

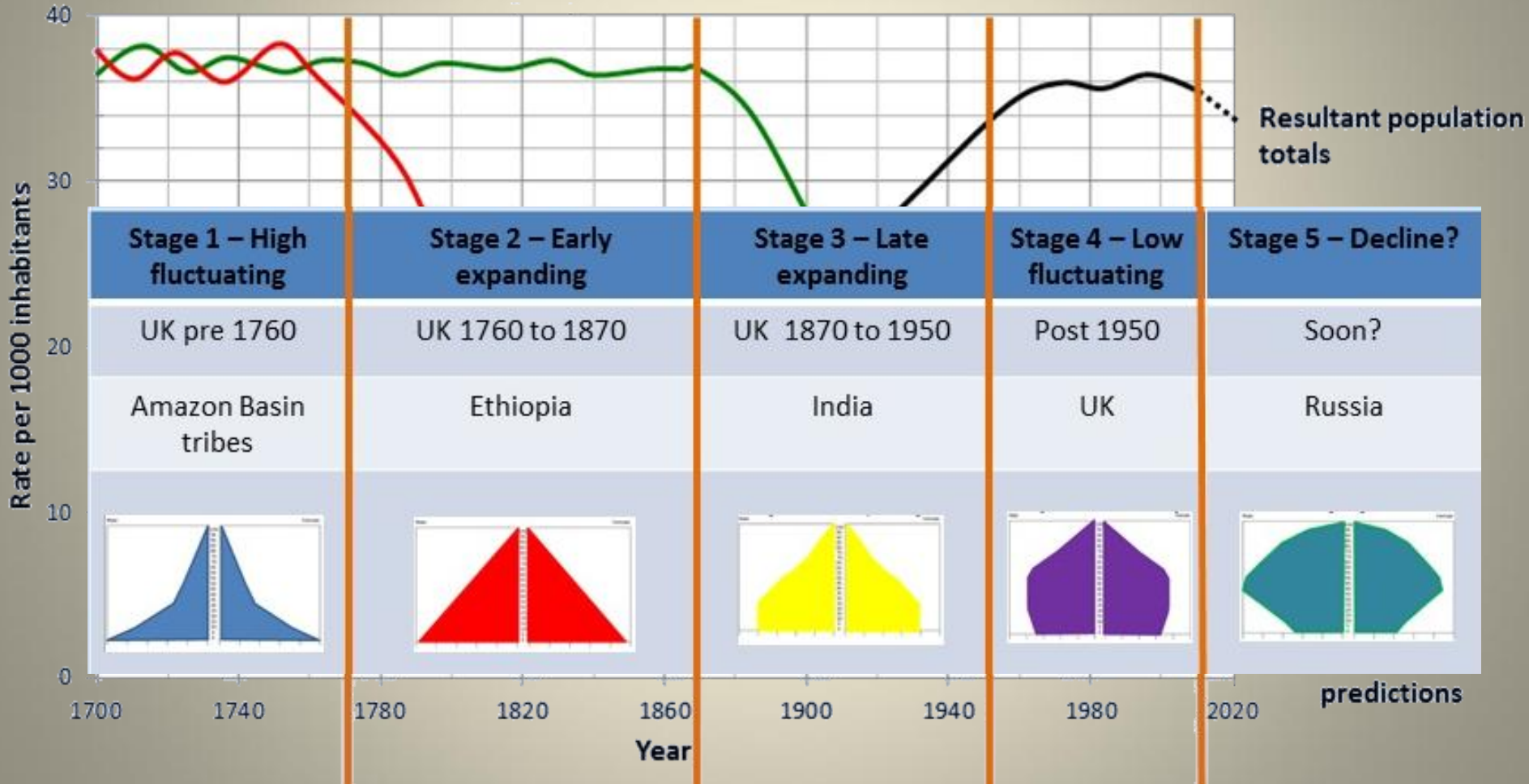
Kenya, Nigeria, Uganda,
Congo, Afghanistan

USA, Canada

Sweden, Denmark,
Italy, Germany



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

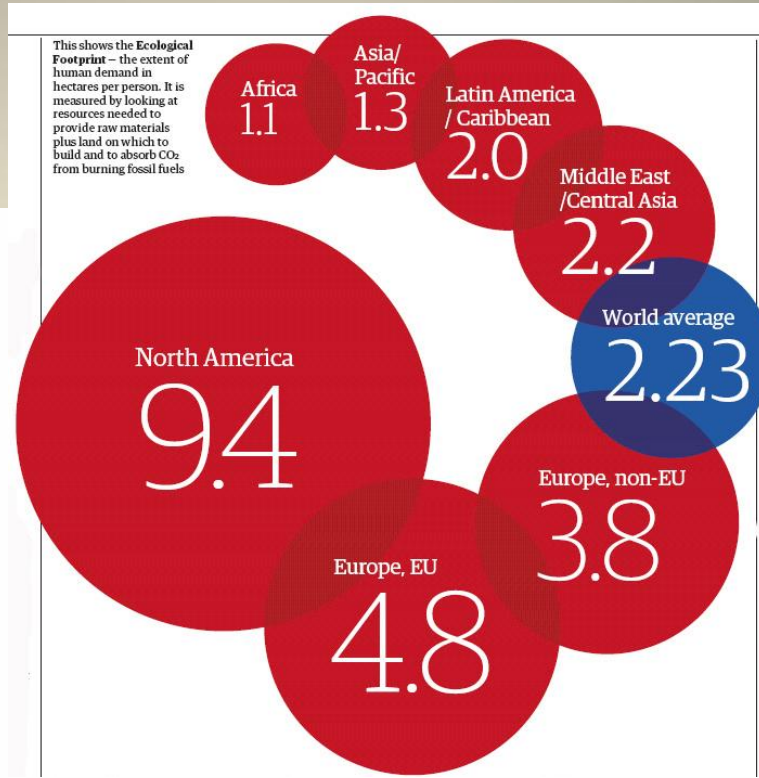
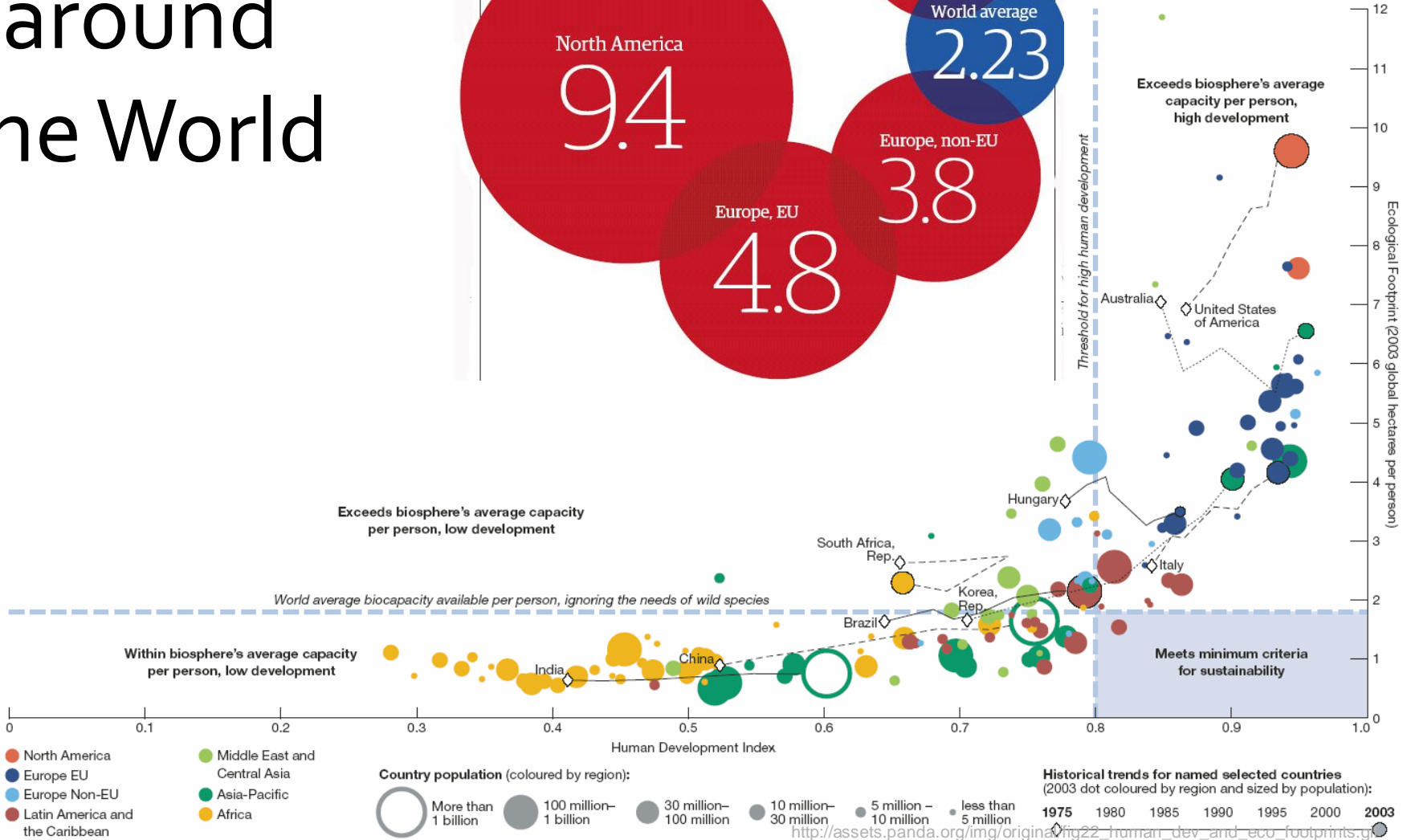


Fig. 22: HUMAN DEVELOPMENT AND ECOLOGICAL FOOTPRINTS, 2003



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/

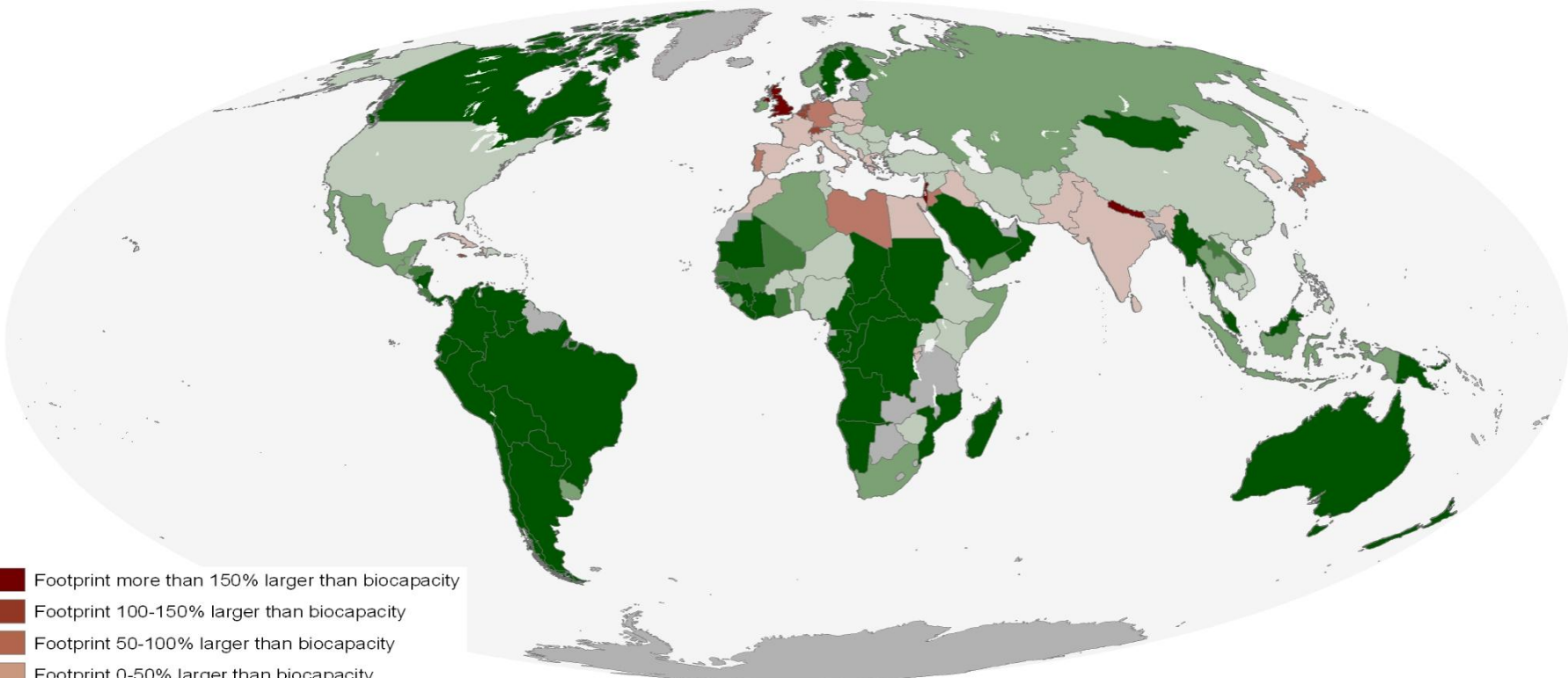
Biocapacity: Supply

- Earth's carrying capacity for the human population
- Capacity of land available to meet human needs
- Estimated at $\frac{1}{4}$ of Earth's surface (11 billion ha)
- Low-productivity areas (e.g. deserts, open oceans) are not included

Supply and Demand

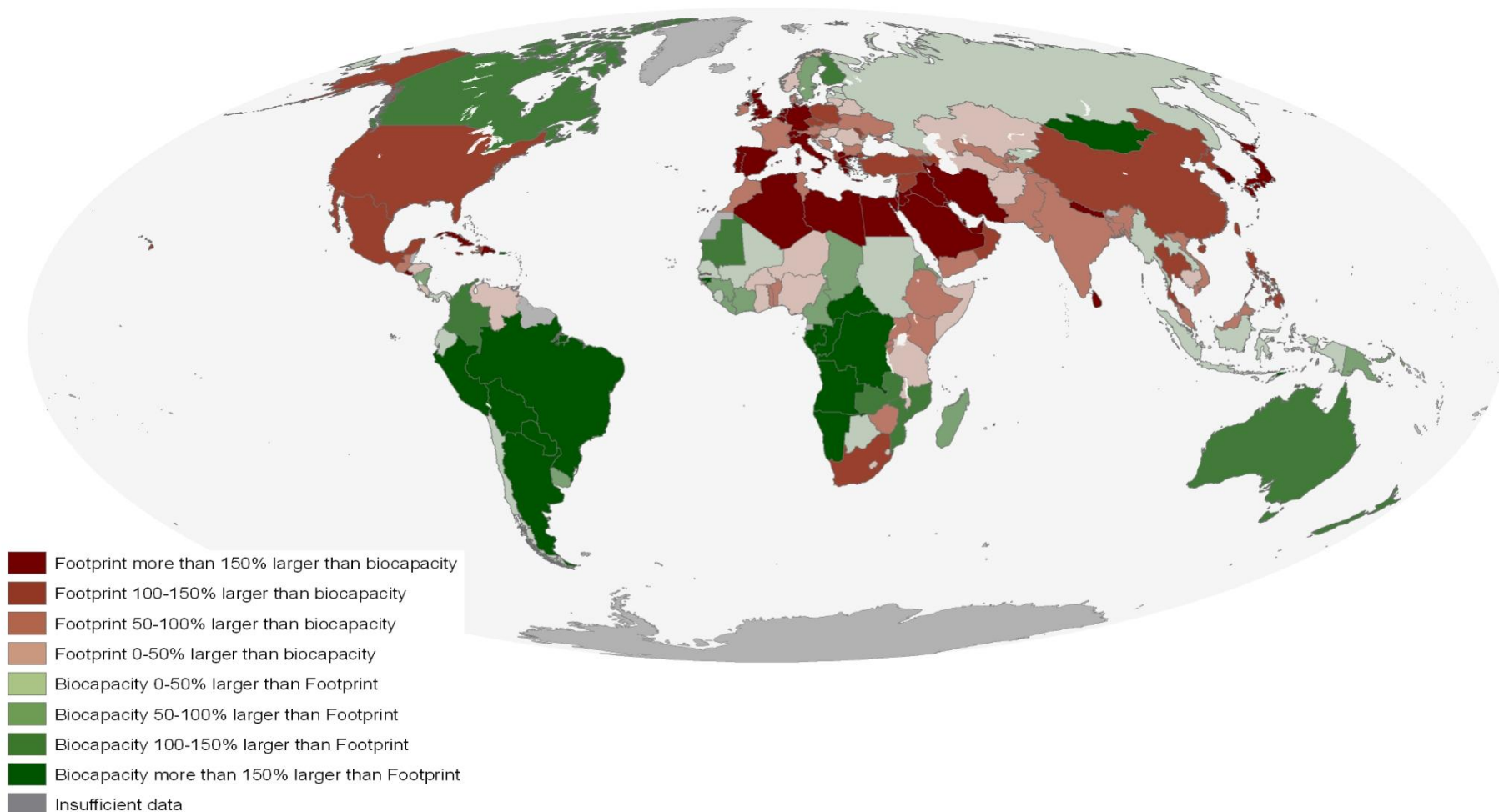
- Does the Earth's biocapacity support the world's ecological footprint?
- Data:
 - 1961: ecological demand was 50% of biocapacity
 - Mid-1980's demand surpassed supply
 - 2002: demand exceeded biocapacity by 23%

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)



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