

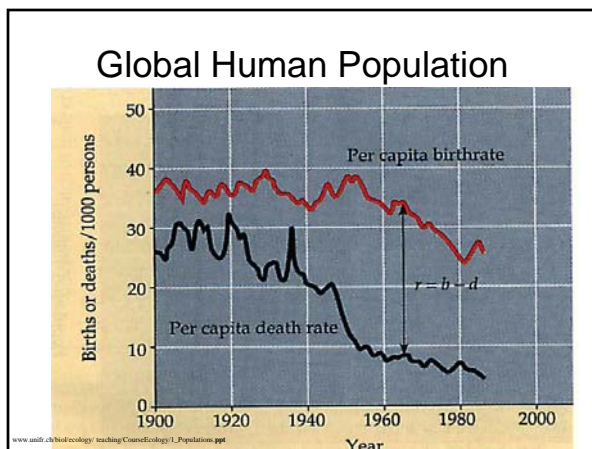
How can human populations be limited?

Which of these do you prefer as a means to limit human population?

- A) Decrease Births
- B) Increase Births
- C) Decrease Death rate
- D) Increase Death rate

How can human populations be limited?

- **Ultimate causes:**
 - Increase deaths
 - Reduce births
 - Movement out of the population
 - Ignore immigration and emigration for now – focus on global human population
- **Proximate causes**
 - What can be done to change birth and death rates?



AIDS as a factor reducing population

World region	Adult HIV prevalence (ages 15–49)	Total HIV cases	AIDS deaths in 2005
Sub-Saharan Africa	6.1%	24.5m	2.0m
Worldwide	1.0%	38.6m	2.8m
North America	0.8%	1.3m	27,000
Western Europe	0.3%	720,000	12,000

Regional comparisons of HIV in 2005 (Source: UNAIDS, 2006 Report on the global AIDS epidemic)

AIDS in Sub-Saharan Africa

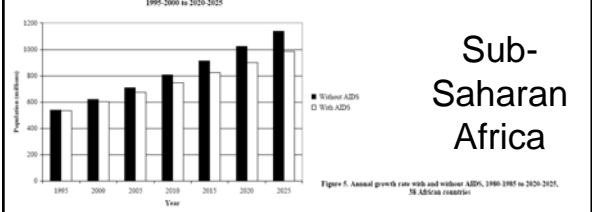
- 24.5 million people here are living with HIV (64% of all people living with the disease)
 - 60% or more of those are women
 - 90% of the worlds children living with HIV (~2 million) live here



http://data.unaids.org/pub/GlobalReport/2006/2006_GR_CH02_en.pdf

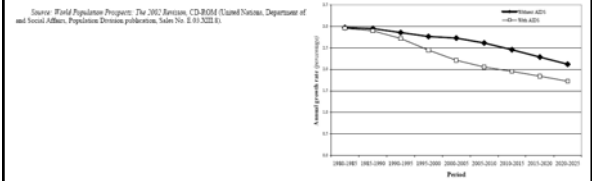
http://data.unaids.org/pub/GlobalReport/2006/200605_ft_subsaharanfrica_en.pdf http://en.wikipedia.org/wiki/Sub-Saharan_Africa

Figure 2. Estimated and projected population size with and without AIDS, 18 African countries, 1995-2000 to 2020-2025



Sub-Saharan Africa

Figure 5. Annual growth rate with and without AIDS, 1990-1995 to 2020-2025, 18 African countries



Source: World Population Prospects: The 2002 Revision, CD-ROM Edition (United Nations, Department of Economic and Social Affairs, Population Division publications, Sales No. E.03.XXX.E)

Countries with AIDS prevalence of 20% or more

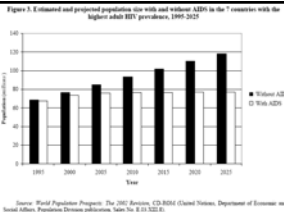


Figure 3. Estimated and projected population size with and without AIDS in the 7 countries with the highest AIDS prevalence, 1995-2025

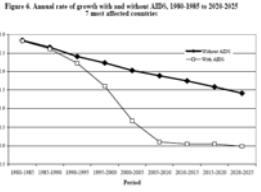


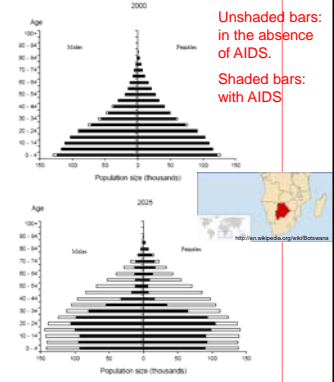
Figure 4. Annual rate of growth with and without AIDS, 1990-1995 to 2020-2025, 7 most affected countries

<http://www.un.org/esa/population/publications/AIDSmpact/ADSWebAnnounce.htm>

Botswana

- ~24% of the population is infected
- By 2025, >half of potential population 35-59 would be lost to AIDS
- Impact stronger on adult females (higher HIV prevalence)

Figure 6. Population size with and without AIDS, Botswana, 1990 and 2025

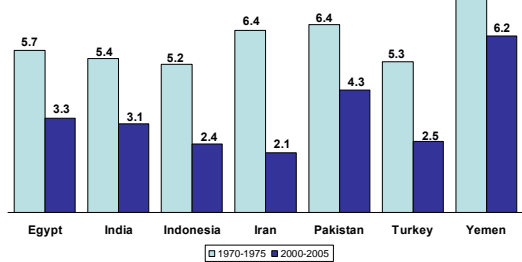


Source: World Population Prospects: The 2002 Revision, CD-ROM Edition (United Nations, Department of Economic and Social Affairs, Population Division publications, Sales No. E.03.XXX.E)

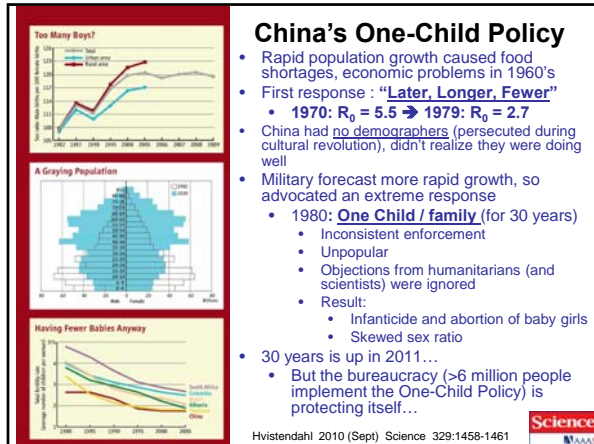
Reduce births?

Trends in Fertility Reduction

Average number of children per woman

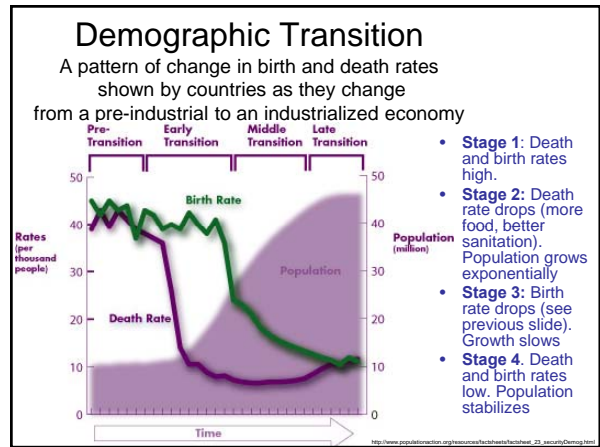
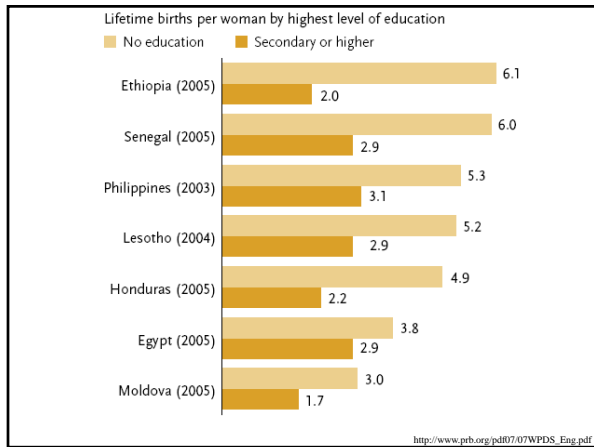


Source: United Nations, World Population Prospects: The 2004 Revision, 2005.



What actions help control human populations by affecting birth and death rates ?

- Education
- Health Care
- Wealth
- Empower women
- Family planning



Muddy points Chapter 13

- Just like before
- Due Wednesday at noon.
- See handout

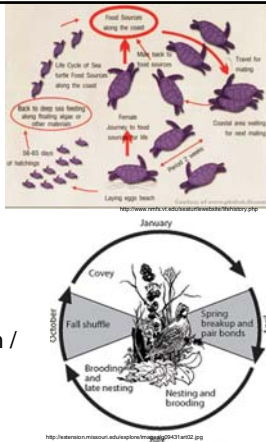
Insect Natural History and Diversity

Biology 495 -602
SS1 5/16 – 6/18, Noon – 3:30
at UA Field Station (Bath Nature Preserve)

- **Learn more about the most abundant group of living things!**
- Become expert at identifying common insects.
- Learn to make and care for an insect collections
- Explore how the natural history of insects affects Ohio's Ecology.
- Many field trips.
- Develop Field Biology skills

Life History (Chapter 12)

- Tradeoffs
- Life histories can be categorized using m_x , l_x , age at maturity, and so forth
 - r/K strategies
 - Opportunistic / Equilibrium / Periodic (Winemiller and Rose)



Ways to categorize life histories

- **r/K selection**
 - Tradeoffs between r and K
- Grime's triangle
 - Tradeoffs between tolerance for disturbance and stress
- **Winemiller and Rose**
 - Tradeoffs among l_x , m_x , α (= age at first reproduction)
- Charnov
 - Tradeoffs among reproductive effort, offspring size, benefit cost ratios

r and K strategies

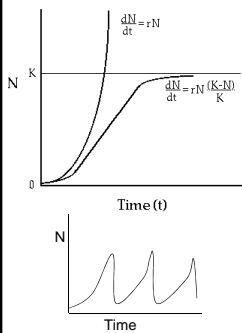


Table 12.1 Characteristics favored by r versus K selection

Population attribute	r selection	K selection
Intrinsic rate of increase, r_m	High	Low
Competitive ability	Not strongly favored	Highly favored
Development	Rapid	Slow
Reproduction	Early	Late
Body size	Small	Large
Reproduction	Single, semelparity	Repeated, iteroparity
Offspring	Many, small	Few, large

Source: Alter Planka 1970.

Eric Planka
UT Austin
1939-

Grime's C-S-R Model of Plant Strategies

- Grime argued that plants face two main challenges

- **Stresses**
 - Incorrect levels of conditions (temperature, moisture, pH...)
 - Shortage of resources (light, water, nitrogen,...)
- **Disturbances**
 - Losses to grazing, disease, windstorms, frost, erosion, fire....

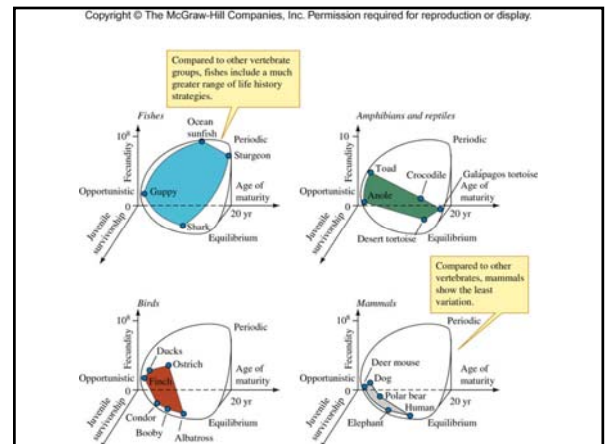
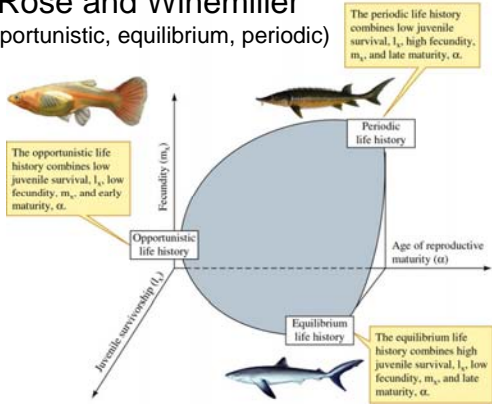
		Intensity of Stress	
		Low	High
Intensity of Disturbance	Low	Competitive Strategy (C)	Stress-Tolerant Strategy (S)
	High	Ruderal (= weed) Strategy (R)	None possible!

- When these factors are at low intensity, **Competition** becomes most important

J. Philip Grime
Univ. Sheffield, UK
~1930-



Rose and Winemiller (opportunistic, equilibrium, periodic)



Things in the book to skip

- Boxes about statistics

Chapter 12

- Learn From book
- There is a trade-off between the number and size of offspring
- When adult survival is lower, organisms:
 - begin reproducing at an earlier age
 - invest more of their energy budget into reproduction
- Life histories may be classified on the basis of population characteristics such as fecundity (m_x), survival (l_x), relative offspring size, and age at reproductive maturity