

*Assigned readings, 7th Edition pp. 1080-1083, 1143-1146, 1152-1156
6th Edition pp. 1092-1095, 1158-1163, 1168-1171

Population Growth

Outline of Lecture 2

- A. Ecology**
- B. Exponential Growth**
- C. Density dependent and independent effects**
- D. Human Population growth**
- E. Impact of human population on environment**

A. Ecology

1. Why does a particular kind of plant or animal live in one place and not another?
2. The examination of the physical and biological variables that govern the distribution of plants and animals.
3. Study of the factors that control the numbers of different kinds of plants and animals.

4. Set of principles by which we attempt to predict behavior of assemblages of organisms.
5. The study of the relationships of organisms with one another, and with their environment.
6. How does this differ from the “popular” view of ecology?

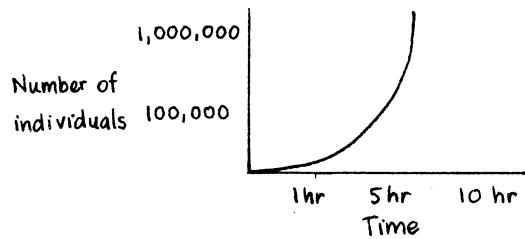
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Population Growth

B. Exponential Growth

(see Fig. 52.11 on p. 1093 in text, 5th Edit.)

(see Fig. 52.8 on p. 1160 in text, 6th Edit.)



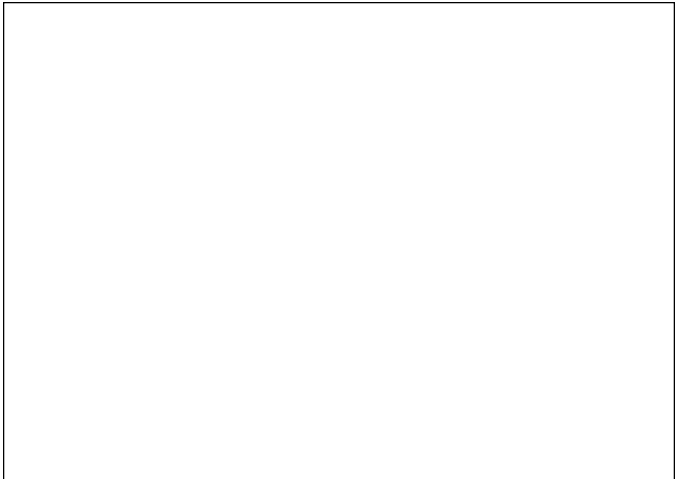
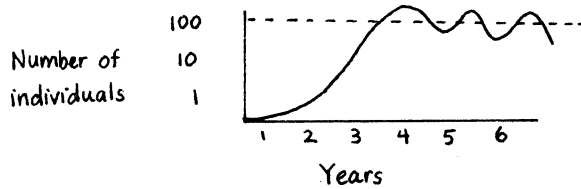
1. The intrinsic rate of natural increase of a population, r ; the biotic potential of a population.
2. If dN/dt is the rate of change in numbers over time, its innate capacity for growth, r_i , can be used to determine population growth as $dN/dt = r_i N$.

3. r = difference between birth rate and death rate (per given number of individuals per unit time).
4. A population ultimately stabilizes at the carrying capacity K , with $dN/dt = rN[(K-N)/K]$
5. Carrying capacity can be considered as the number of different individual organisms that the resources of a given area can support.

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6. S-shaped, sigmoid, curve (logistic population growth model)

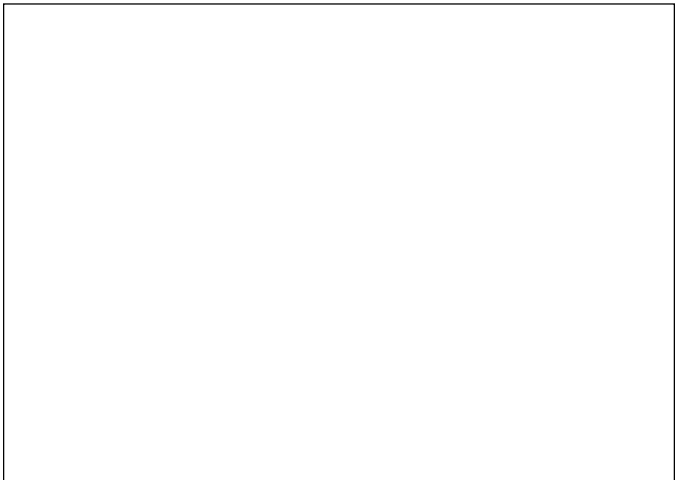


C. **Density-dependent effects** – factors that increase as a function of population size increases.

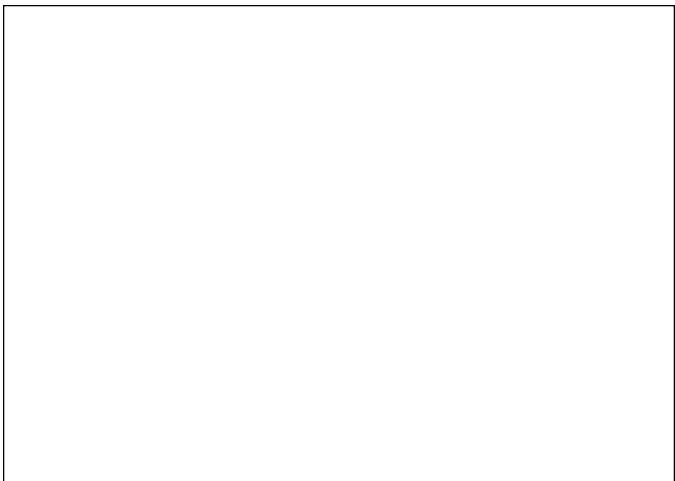
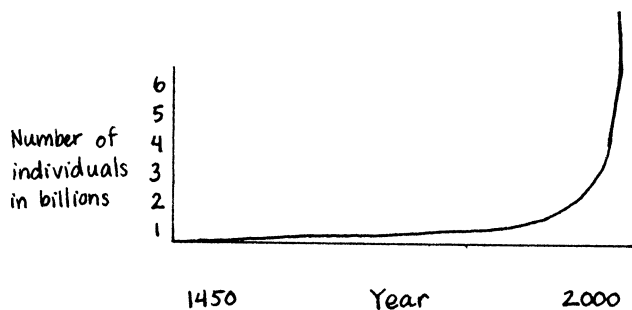
Density-independent effects – factors that operate regardless of population size.

Long-term cycles often involve both effects.

What are examples of each of these effects?



D. Human population growth



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E. Neo-Malthusian position:

Impact of human population
= # of people X their affluence X environ-
mental effects of technology used to
achieve affluence

What is the difference in “Impact” of an
individual living in a developed compared
to an undeveloped country?

1. **“Marxist position”**: When humans lack the basic means of subsistence, and when there is massive and permanent unemployment, then poverty breeds overpopulation because larger populations are necessary to survive.
2. **“Neo-conservative”**: Humans have omnipotent powers to extend resources; new technology more than compensates for problems of having additional humans.

3. **“Neo-Malthusians”**: increased human population causes a threat to the environment.
4. We should accept neo-conservative position that more food must be grown and science must produce solutions; should accept Marxist position that governments must respond wisely to population growth; should accept neomalthusian position because of “impact” components.