


ENVIR 202: Lesson No. 12



## Limits to Growth

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## Overview

- ❖ Environment & Civilization
- ❖ The "Prophets of Doom"
- ❖ The Limits to Growth Model
- ❖ Trends & Explanations

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## The Basic Question



- ❖ Are there limits to growth?  
Both in terms of:
  - the total number of people that can be supported on this planet, and
  - in terms of the use the material resources necessary to sustain them?

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## The Prophets of Doom

- ❖ Thomas Malthus *Principles of Population*
- ❖ Paul Ehrlich *The Population Bomb*
- ❖ Meadows, et al. *The Limits to Growth: A Report to the Club of Rome*
- ❖ Garrett Hardin *The Tragedy of the Commons*
- ❖ James Lovelock *Gaia*

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## Thomas Malthus (1766-1834)



- ❖ *An Essay on the Principle of Population* (1798)
  - Population growth is exponential
  - Increase in food supplies is arithmetic.

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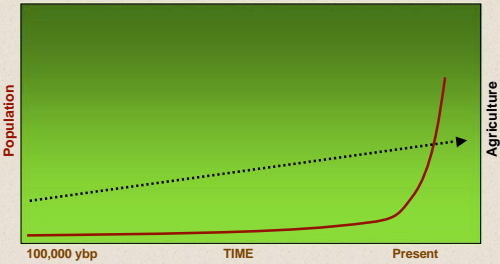
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## Malthus (Continued)



The graph plots Population and Agriculture against Time. The x-axis is labeled 'TIME' with points '100,000 ybp', 'Present', and 'Present'. The y-axis is labeled 'Population' and 'Agriculture'. A solid red line representing population shows exponential growth, starting near zero at 100,000 ybp and rising sharply towards the 'Present' mark. A dashed black line representing agriculture shows arithmetic growth, starting at a low level and increasing linearly towards the 'Present' mark. The population line eventually crosses above the agriculture line.

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### Malthus *(Continued)*



The result will be . . .

- † Famine
- † Pestilence (Disease)
- † War
- † Death

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### Paul Ehrlich



- ❖ *The Population Bomb* (1968)
- ❖ Global human population is threatening our future.
- ❖ . . . worldwide, nearly a billion people are not getting enough to eat, evidence that we have already passed the human population Earth can sustain.

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### Paul Ehrlich



- ❖ And worse, as we attempt to feed our growing numbers, we are jeopardizing Earth's ability to sustain any life at all.

**I = P x A x T**

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## How many people?



❖ Trends

1. Exponential population growth
2. Technological advances

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## The Club of Rome



Meadows DH, Meadows DL, Randers J, Behrens W. *The Limits to Growth: A Report to The Club of Rome* (1972).

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## The Limits to Growth

❖ *The Limits to Growth* (1972)

- VHS was copied from a 16 mm movie
- Reflects the state of the world in 1970
  - > What are the major arguments?
  - > What has changed / What hasn't?

❖ Produced by:  
The Lane County Council of Governments

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### Exploring the Limits

- ❖ Reactions?
- ❖ What happened?
  - Were they right? partially right? totally wrong?
  - What has changed? & What hasn't?
  - To what evidence can you point to support their argument?
- ❖ Continue this discussion in your sections next week.

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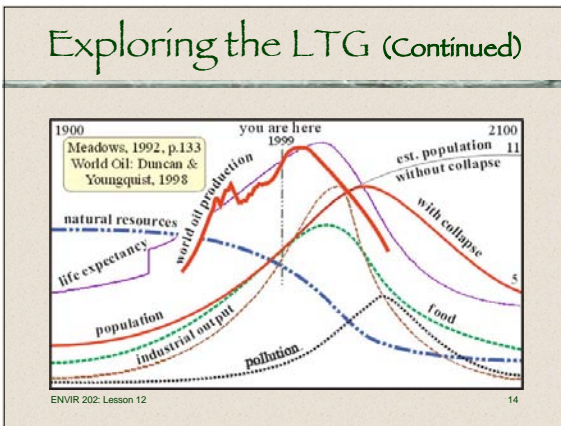
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### Garret Hardin

- ❖ *The Tragedy of the Commons* (1968)
- ❖ William Forster Lloyd's "Commons"
  - Lloyd examined the fate of a common pasture shared among rational, utility-maximizing herdsmen.
- ❖ Hardin showed widespread implications not only for population control, but also for the over-exploitation and eventual ruin of any resource held in common.
- ❖ Carrying Capacity



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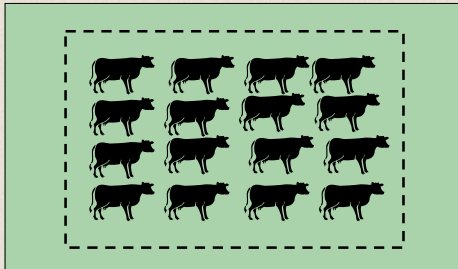
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### The "Commons"



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### James Lovelock



- ❖ James Lovelock. *"Gaia: A New Look at Life on Earth,"* 1979.
- ❖ The Gaia Hypothesis
  - Biota not only adapts to its environment, but is also constantly adapting its environment to itself
  - Daisy World

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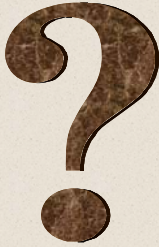
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### Questions



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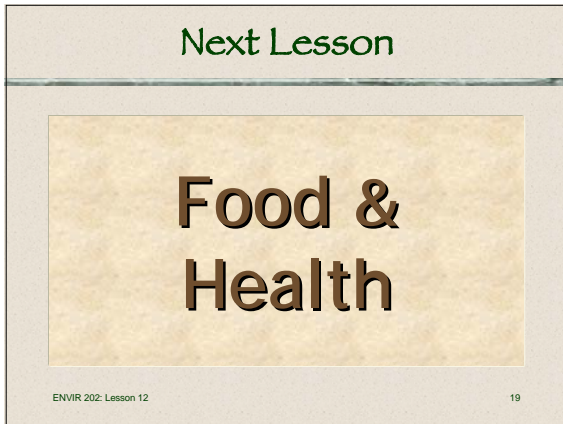
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Next Lesson



**Food & Health**

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