Ecology is NOT the same as environmentalism

- Environmentalism

- Ecology is the scientific study of the interactions between organisms and their environments
Ecology provides the basis for understanding and solving environmental problems.

As organisms interact with it they are able to modify it.

yet, their survival depends on these interactions.
Ecologists study these interactions at several levels.

Population Ecology

Population:
group of individuals of same species living in a particular area

Population Ecology:
Studies how and why populations change
Population size

Number of individuals present at a given time and in a given area

- Orange means a country > 100 million
- Blue means a country between 50 and 100 million
- Green a country between 40 and 50 million
- Yellow a country between 30 and 40 million
- Lavender a country between 20 and 30 million
- Pink a country between 10 and 20 million
- Grey a country between 5 and 10 million.

The size of a population may change through time

Populations grow, shrink, or remain stable, depending on:

- Births

- Deaths

Growth rate:

Change in the size of a population expressed as a percentage of the population
Population growth curves show change in population size over time.

How does a population grow by a fixed growth rate (%)?

Exponential growth curve

- **J-shaped curve**

- Growth by a fixed %, rather than a fixed amount.

Analogy:

*Similar to growth of money in a savings account*

Under which environmental conditions, does exponential growth happen?

*Under unlimited resources (endless amount of food, space, no disease, no predators)*
Case: Sheep introduced in Tasmania

EARLY 1800’s Sheep introduced into Tasmania, sheep had unlimited food resources → exponential growth in 2 decades, resulted in 2.5 million sheep

MID 1800’s Decreased growth due to dwindling resources and disease
LATE 1800’a population stabilized at 1.6 million sheep

In nature, can an exponential growth continue forever?

Logistic growth is seen under limited resources

S-shaped curve

During logistic growth:
• Population grows exponentially
• When resources dwindle, growth slows close to zero
  Births = deaths

• Population size stabilizes, this is the maximum number of individuals of a given species that the environment can sustain. This size is called the CARRYING CAPACITY

What was the carrying capacity of sheep in Tasmania?
Will the carrying capacity be the same for rabbits in Tasmania?
Is this an exponential or logistic growth?

Questions to consider

Can we keep this exponential growth?

What is the carrying capacity for humans?

How could can we calculate it?
Questions to consider

Can we keep this exponential growth?

What does population ecology tell us?

What is the carrying capacity for humans?

How can we calculate it?

Ecological Footprint:
measures the amount of earth surface that an individual or a country needs

Size of land depends on:
- land to provide all resources a person needs
- land to dispose of all waste produced by a person

How will the size of human’s ecological footprint affect
The carrying capacity for humans?
Ecological Footprints vary between countries

An average person in the US requires 9.7 ha =

The size of the Ecological Footprint for each of us will determine the Earth’s carrying capacity for humans
Is the size of our population the only issue to consider?

What are companies offering us more of?
- cheaper vs. quality
- disposable vs. reusable
- more packaging vs. less packaging

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<th>Company</th>
<th>Revenues (Net Sales in millions of dollars)</th>
<th>Percent of Revenues Allocated to</th>
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<td>Profit (Net Income)</td>
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