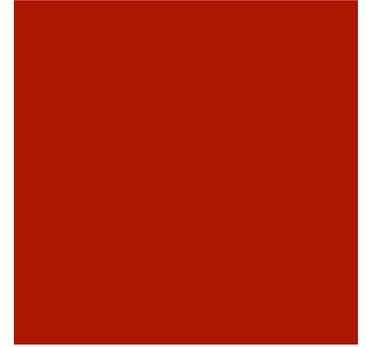




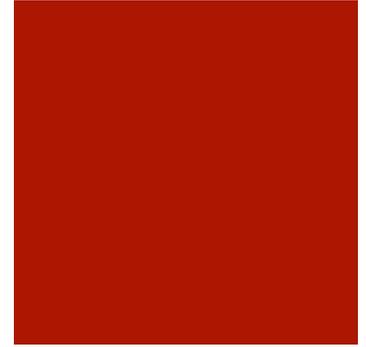
Introducing Environmental Science and Sustainability ~ *Ch. 1 & 2*

Outline

- Environmental sustainability
- Impact on the environment
- Ethics, values, & worldviews
- Nature of science
- Risk assessment
- Sustainability

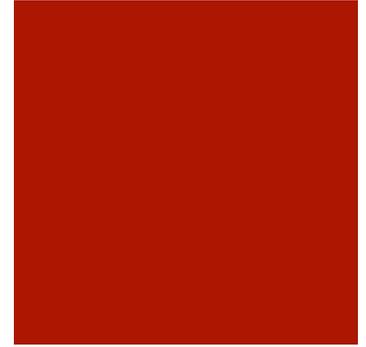


What do you think?



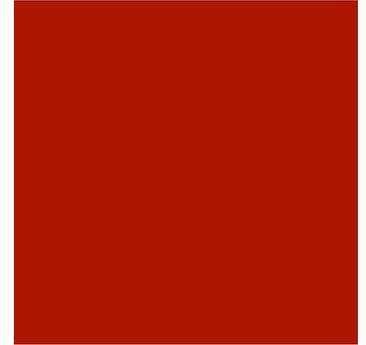
- What is environmental science?
- What are the goals of environmental science?

Environmental Science



- *Interdisciplinary* study of the interconnected *relationships* between *humans* and the *living* and *nonliving* environment.

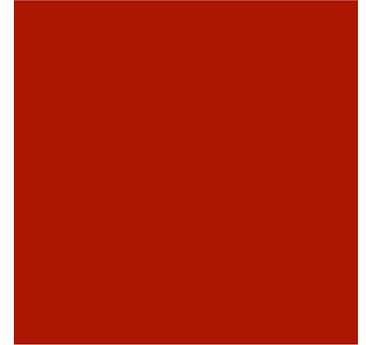
Goals of Environmental Science



- Identify, understand, and solve environmental problems.
- Establish general principles about how the natural world functions.

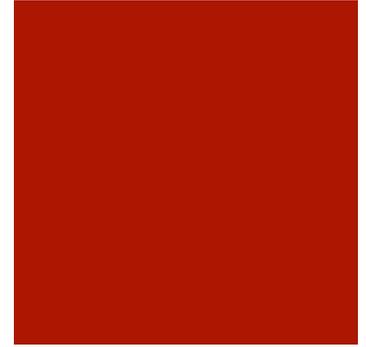


Environmental Sustainability



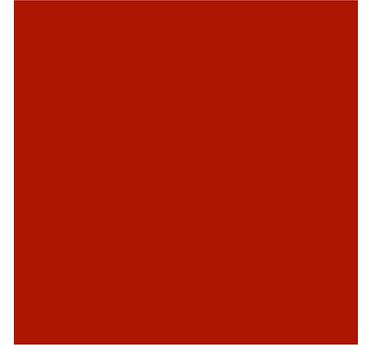
- *Sustainable* - Ability to meet current human needs without compromising the ability of future generations to meet their needs.
- *Result:*
 - Environment will function indefinitely.

Environmental Sustainability



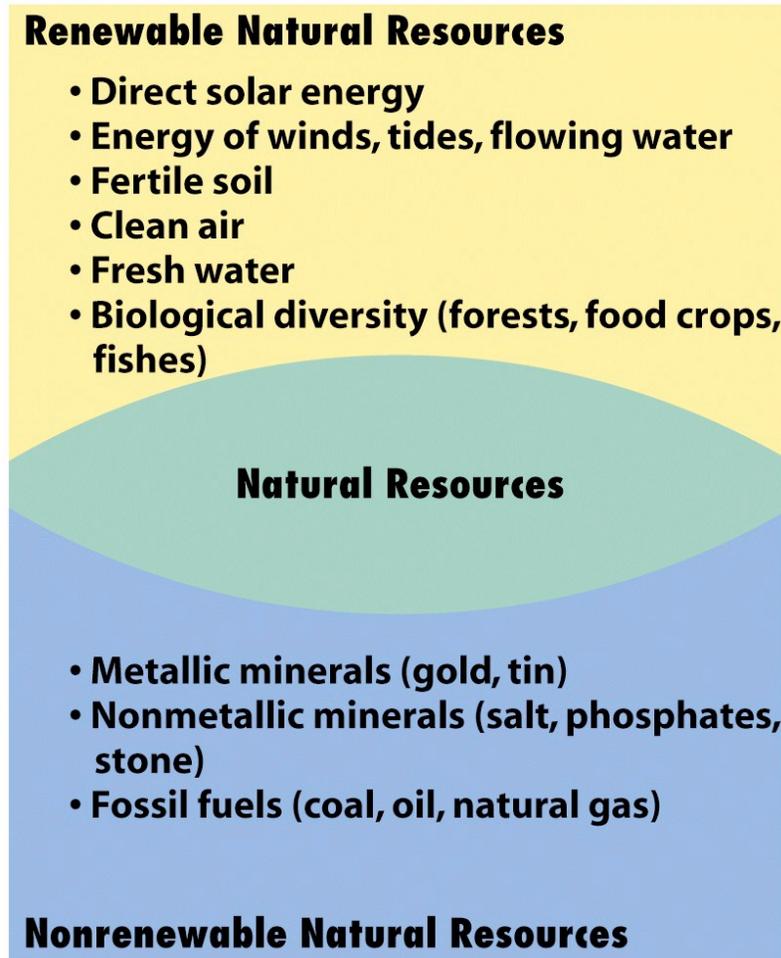
- Principles of **Sustainability**:
 - Considers the effect of human actions on the well-being of the environment.
 - Resources are limited.
 - Need to understand ALL costs associated with using Earth's resources.
 - EVERYONE is responsible for acting sustainably.

Environmental Sustainability



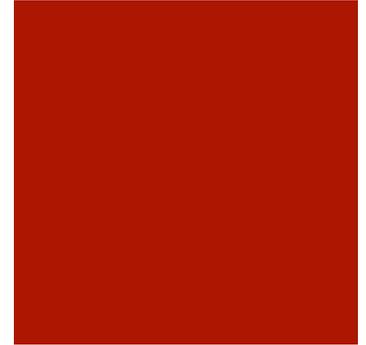
- Why are we not acting sustainably?
 - Rapid use of resources (renewable vs nonrenewable)
 - Pollution of resources
 - Populations increase while resources do not.

Environmental Sustainability



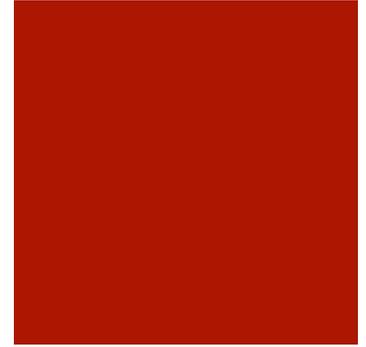
Renewable, but only when managed in a sustainable way

Environmental Sustainability



- “Tragedy of the Commons” by Garrett Harden
 - ecological problems are the result of a conflict between short-term individual conflict & long-term human welfare.

Environmental Sustainability



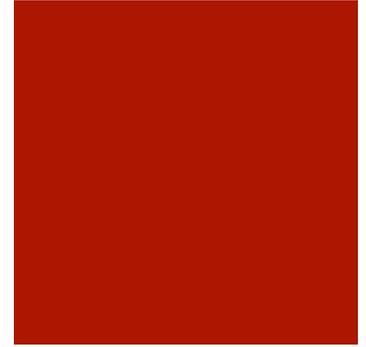
■ *Global commons*

- common resources available to everyone but for which no one individual is responsible
- Ex. Fish, air, water

■ *Stewardship*

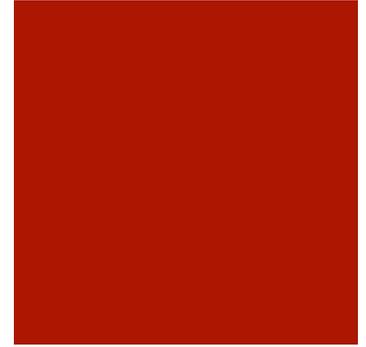
- shared responsibility for the environment

Tragedy of the Commons



- Lab Objective:
 - To determine how human action affects the sustainability of global commons.
- Lab Overview:
 - Read background information
 - Part 1: read directions, collect data, answer questions
 - Part 2: read directions, collect data, answer questions
- Lab Report:
 - Introduction, procedure, results, analysis, conclusion

Primary Problems



1. Natural Resource depletion - *any natural materials used by humans.*
2. Pollution - *introduction of harmful substances*
3. Loss of Biodiversity - *variety of organisms in a given area.*

Primary Causes:

1. Population – environment can't support increasing population
2. Consumption – Using up or polluting natural resources faster than they can be renewed

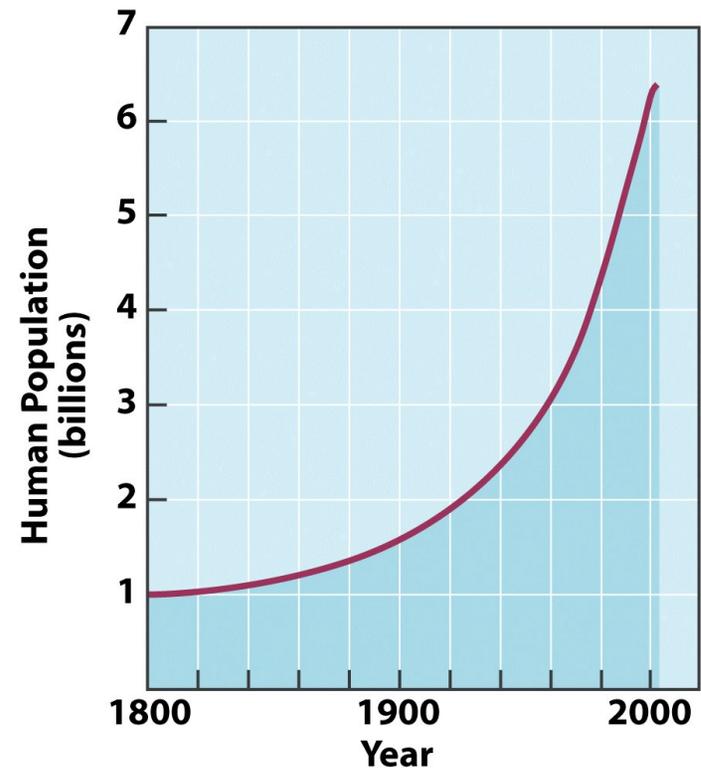
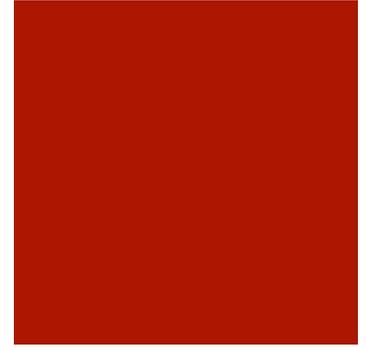
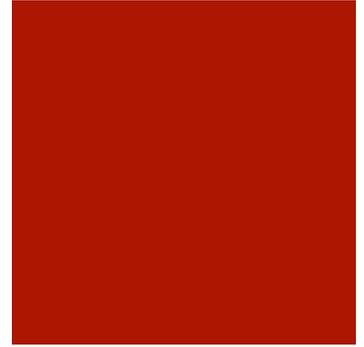


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Population, Resources, Environment



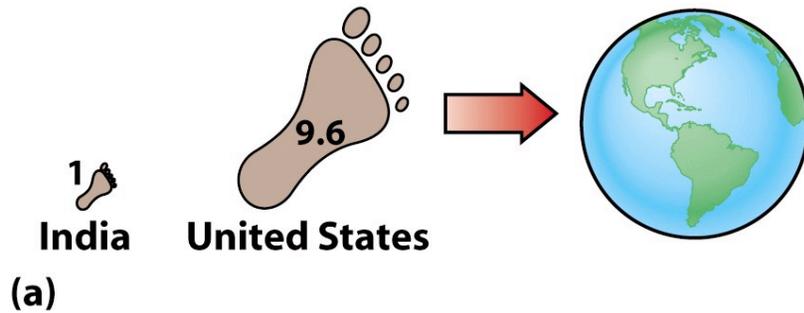
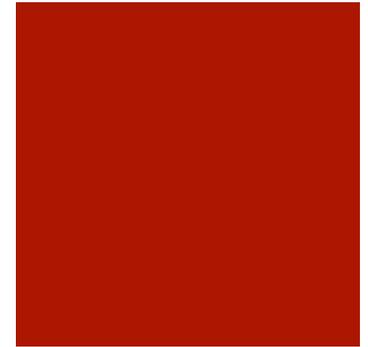
- Availability of resources will determine future populations' quality of life.
- **Resource consumption**
 - Amount of resources a population uses
 - Greater consumption in the US
 - 1 US child has the environmental impact of 12+ children in less developed countries



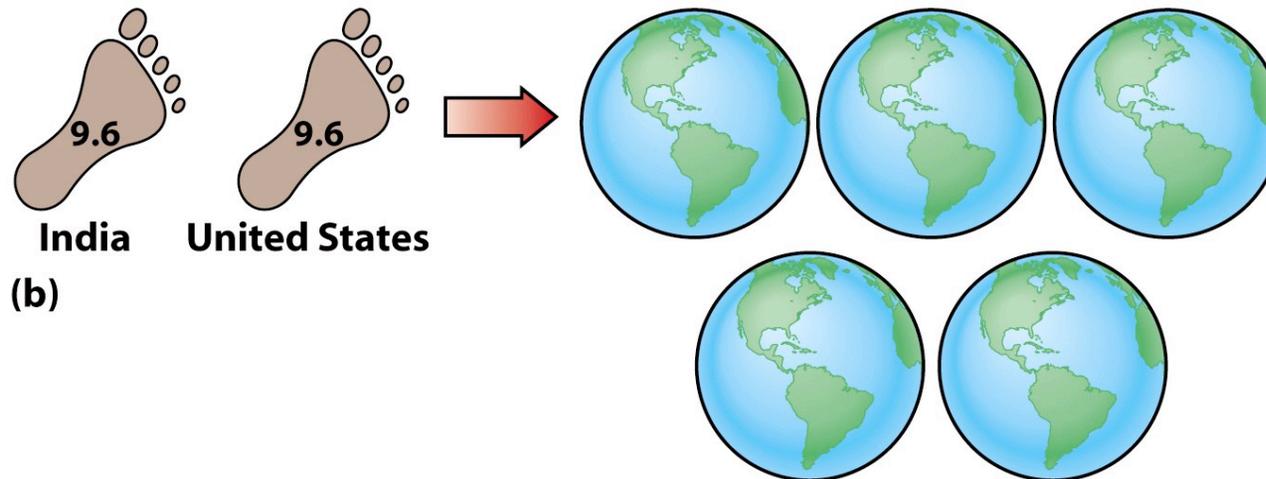
Population, Resources, Environment

- Factors affecting the environment:
 - **People Overpopulation**
 - Excess # of people cause environmental damage.
 - **Consumption Overpopulation**
 - People consume an abnormal amount of resources.

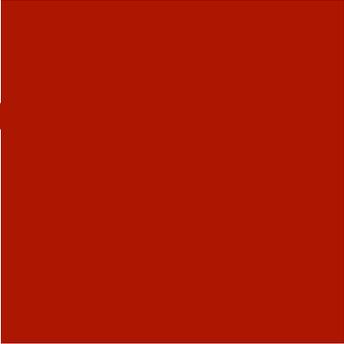
Population, Resources, Environment



*What's your
footprint?*



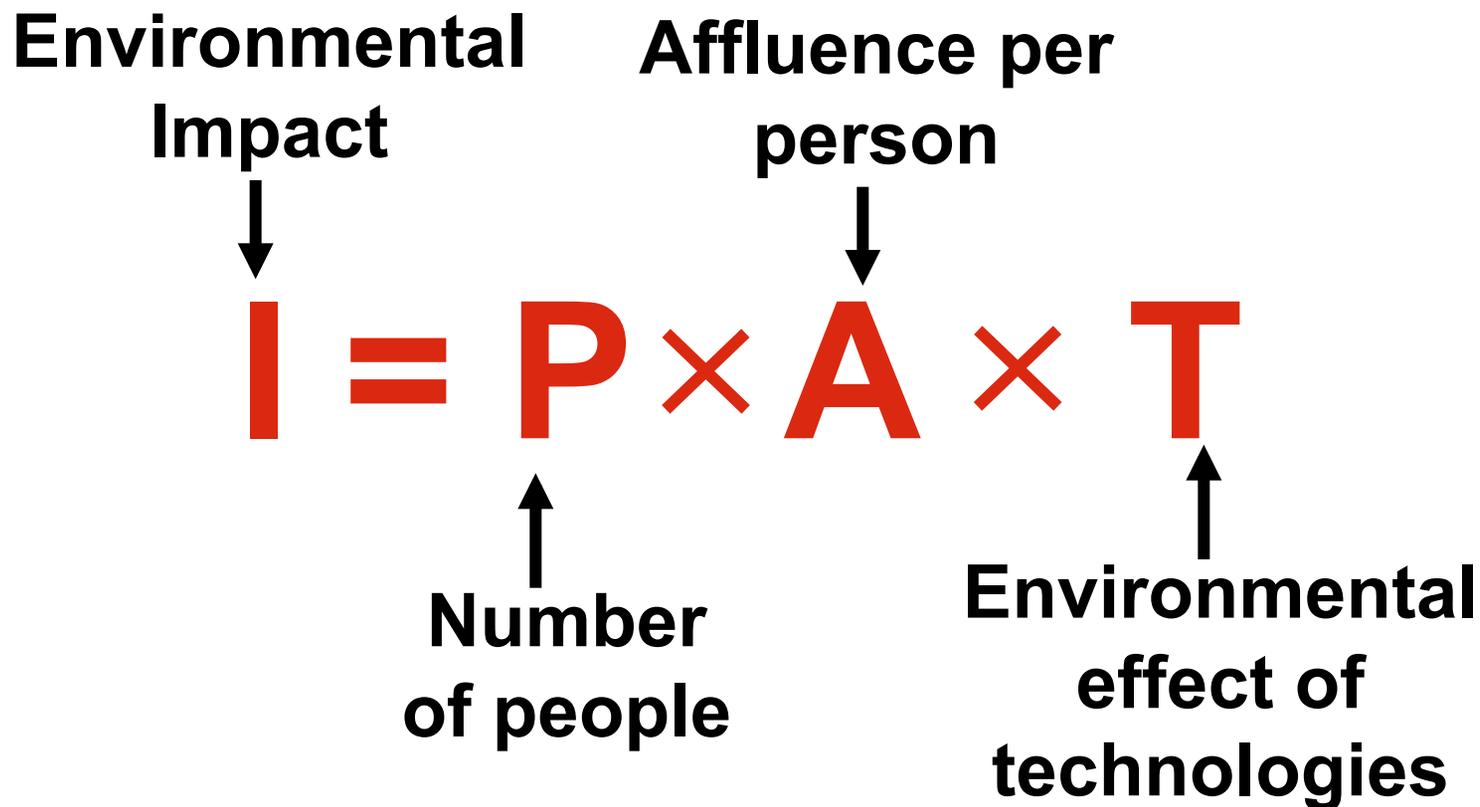
Population, Resources, Enviro



- **IPAT Model**

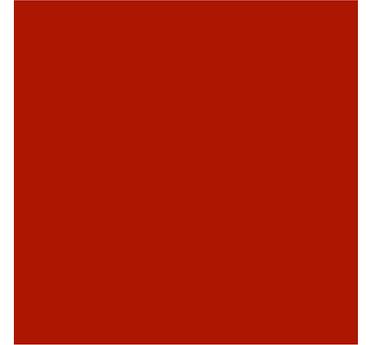
- estimates the impact of consuming a resource
- Problems:
 - Don't know all the environmental impacts
 - # of people, amount of consumption, & technology are always changing

Population, Resources, Environment



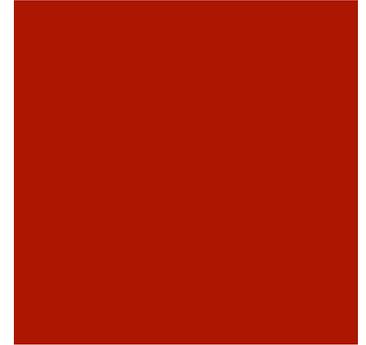
IPAT Example

- Determine the impact in terms of CO₂ emissions per year when there were 3 billion people in 1960, an average of 0.05 vehicles/person, and 2.0 tons of CO₂ emissions per car per year.



IPAT Example

- Determine the impact in terms of CO₂ emissions per year when there were 3 billion people in 1960, an average of 0.05 vehicles/person, and 2.0 tons of CO₂ emissions per car per year.
- $I = 3,000,000,000 * 0.05 * 2$
- $I = 350,000$



Ethics, Values, & Worldviews

- **Ethics**

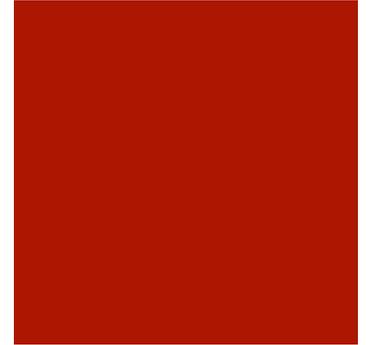
- application of human values

- **Values**

- important principles to an individual or society

- **Environmental ethics**

- considers the moral basis of environmental responsibility for today and the future



Ethics, Values, & Worldviews

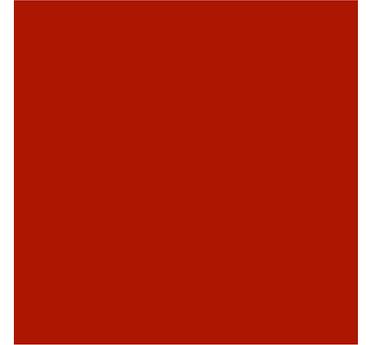
- **Environmental worldviews**

- Common perspectives about the environment based on values.

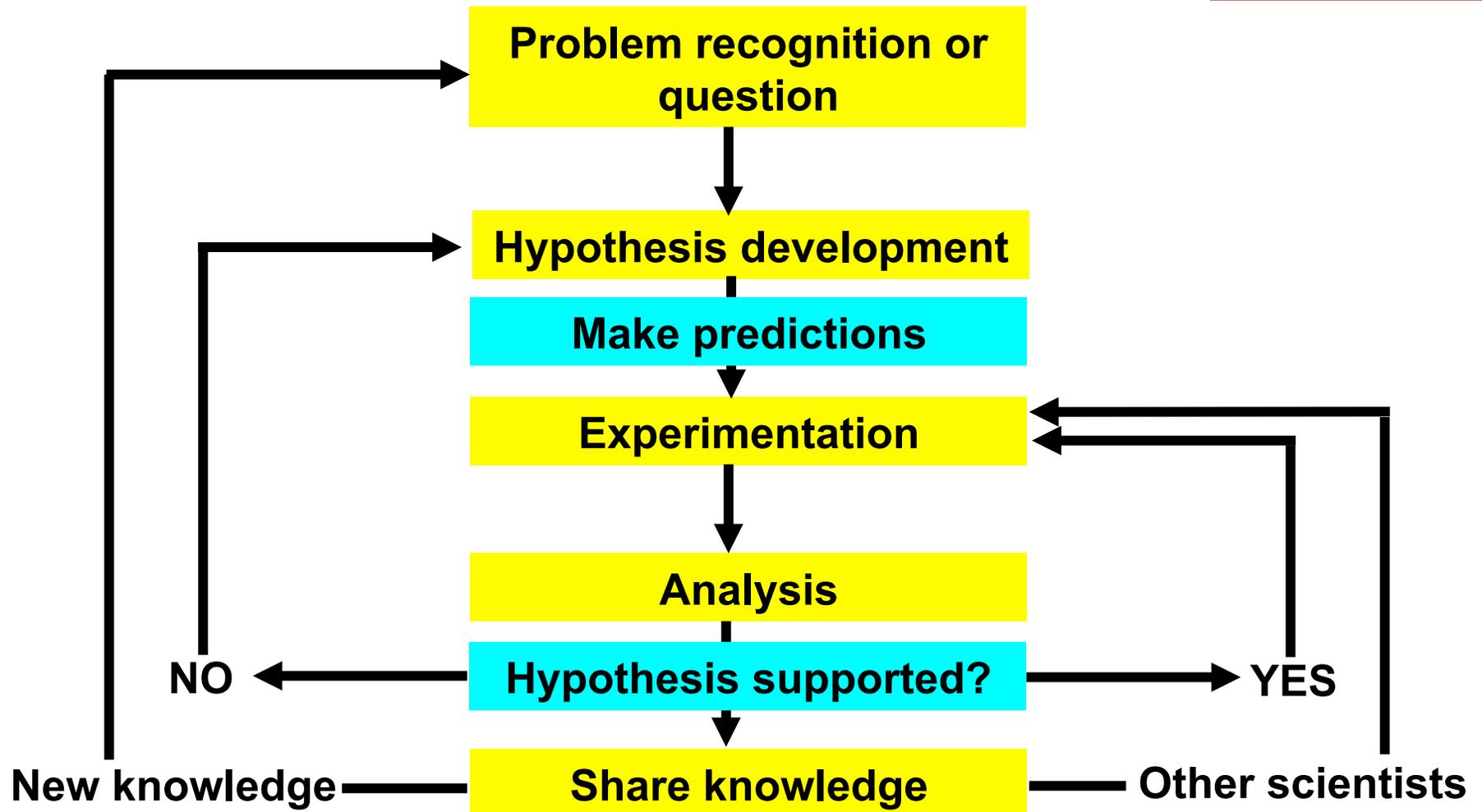
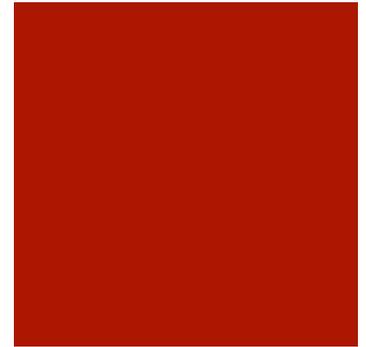
- **Expansion** - human-centered.

- **Frontier attitude** - desire to quickly exploit and conquer nature

- **Deep ecology** - humans are equal to other species; harmony with nature

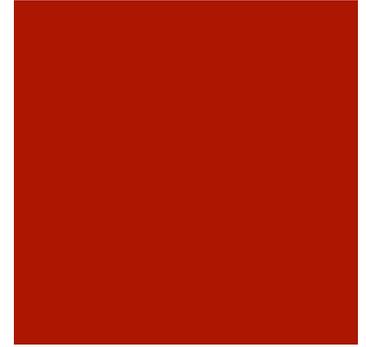


The Process of Science



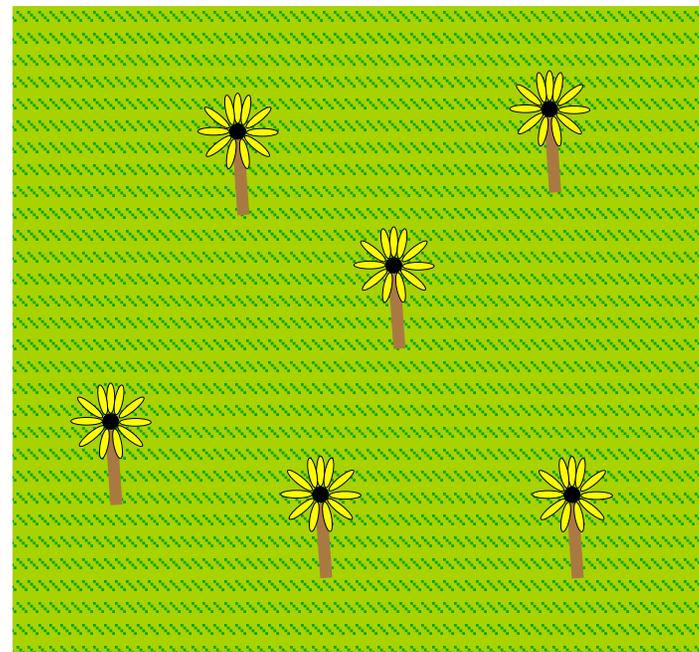
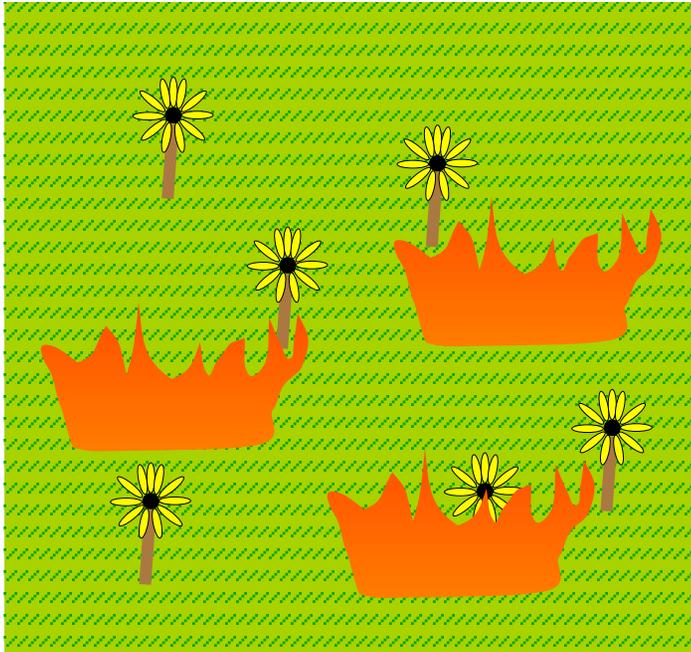
Experimental Design

- Experimental Group
 - Has treatment
- Control Group
 - Does not have treatment; unaltered
- Independent Variable (1)
- Dependent Variable (1)



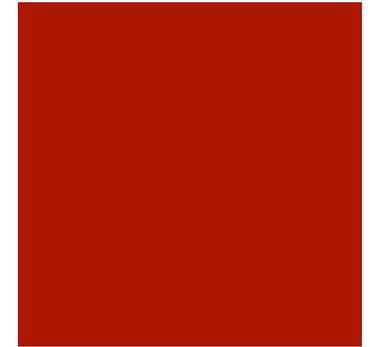
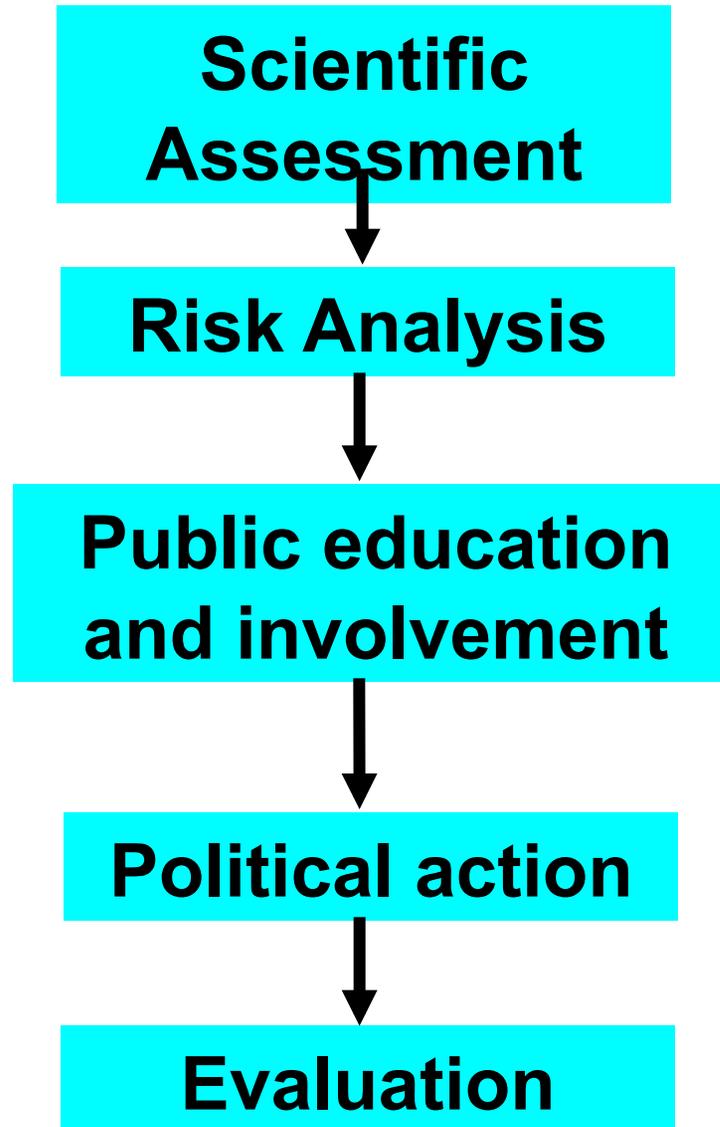
Experimental Design

- *Hypothesis:* Burning will increase frequency of prairie wildflowers.

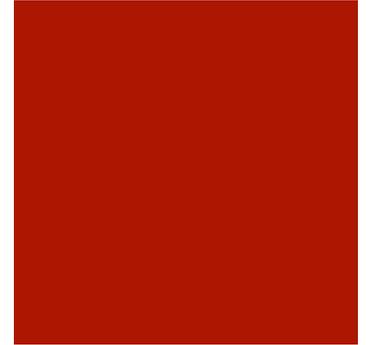


Which is the control group?

Ecological Risk Assessment



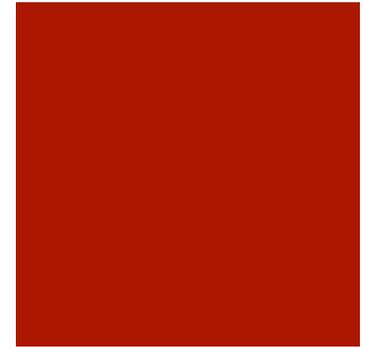
Ecological Risk Assessment



- Estimates the probable effects of a human activities on ecosystems.
 - **Environmental Stressors** - human caused changes that effect the environment
 - **Cost-benefit analysis** - estimated costs of action are compared with possible benefits of action
 - **Risk Management** - evaluation of risks and the development and implementation of laws

Ecological Risk Assessment

- Case in Point: Lake Washington



- Scientific assessment
- Public education and involvement
- Political action

Figure 1-15 Environment, 5/e
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Ecological Risk Assessment

- Case in Point: Lake Washington

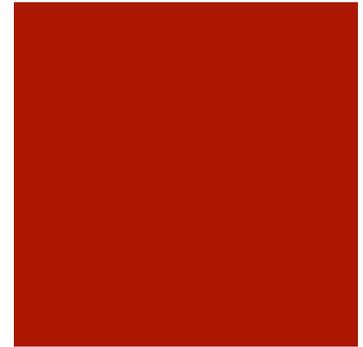


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Evaluation

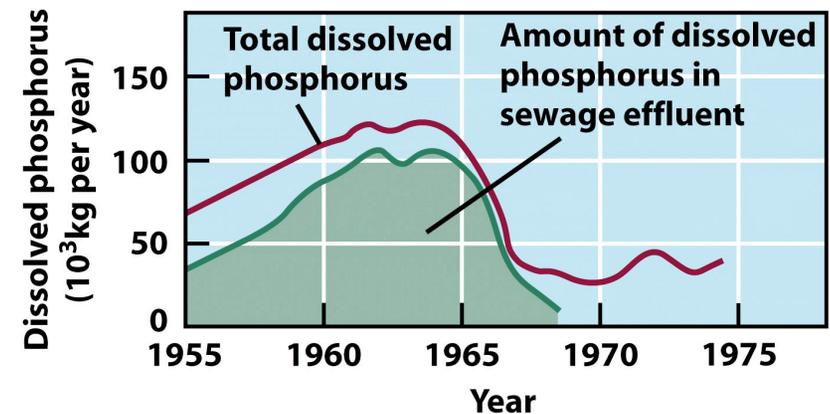
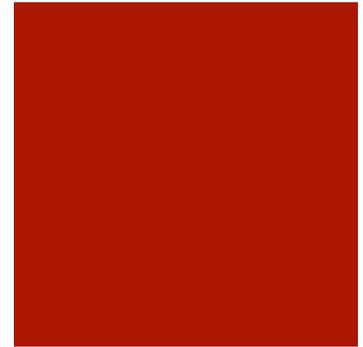


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Ecological Risk Assessment

- Case in Point: Lake Washington



Evaluation

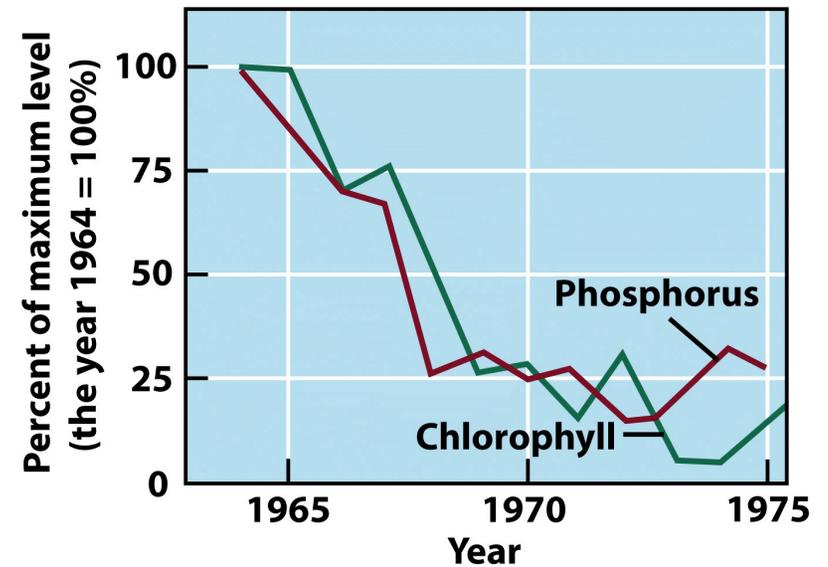


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