

AP Environmental Science

Unit 5: Land and Water Use

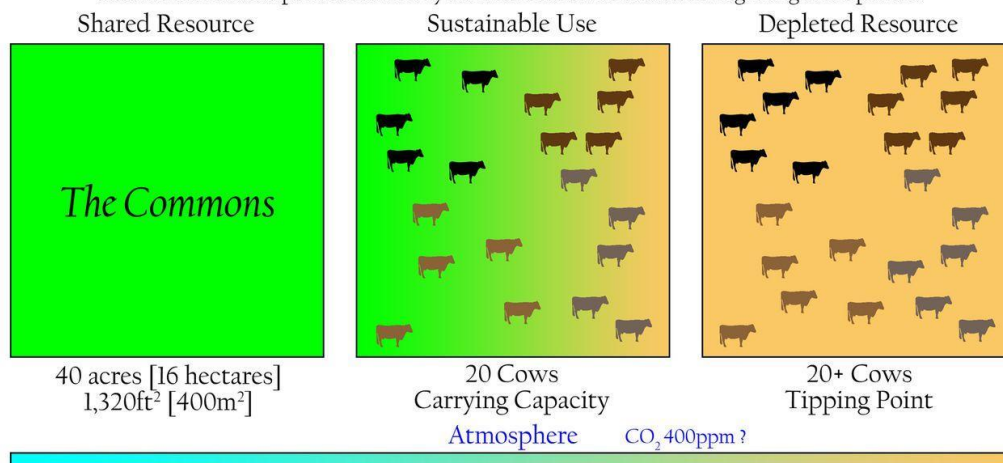
From Simple Studies, <https://simplestudies.edublogs.org> & @simplestudiesinc on Instagram

Tragedy of the Commons

- **Tragedy of the commons:** Economical situation where individuals consume resources to their advantage. For example, fishing or farming.
- **Overfishing** is catching way too many fish at one time, depleting the populations so much that the breeding population left cannot reproduce or maintain the fish population.

The Tragedy of the Commons

Imagine an open pasture shared by multiple cattle owners. Each owner increases their herd to maximize their benefit. With an unregulated resource this is "logical" since the benefit is enjoyed by the individual and the impacts are shared by all. This leads to the ultimate overgrazing of the pasture.



The Tragedy of the Commons applies to numerous environmental, economic and social phenomena and has particular relevance to greenhouse gas regulation related to global warming.

Hardin, G. (1968-12-13) "The Tragedy of the Commons." Science 162 (3859): 1243-1248
The "commons" dimensions and formulas are for illustrative purposes only.

Stephens Planning & Design LLC
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- **Clear Cutting:** removing all trees in the area for industrial or agricultural causes.
 - Clear cutting destroys natural habitat and degrades the specific environment.
- **The Green Revolution:** The start of agriculture, creating the use of **GMO** (genetically modified organisms) plants, fertilizers, pesticides, and advances in irrigation. Some of the GMOs include pesticides killing good insects for agriculture and harming other wildlife. The use of them also decreases the amount of family farms.

Agricultural Impacts

- With the increase of urbanization, a large percentage of crop lands are important to feed the whole population in the United States.
- Increases the production of food

Types of Agricultural practices

- **Slash and Burn:** Burning of cut down vegetation
- **Fertilizer:** chemical used to help crops grow faster; negatively impacts waterways when there is run-off
- **Pesticides:** kills off any unwanted organisms.
- **Tilling:** mixing soil when in need of adding fertilizers.

Irrigation Methods

- **Flood irrigation:** surface irrigation where water is dumped all over the land.
- **Drip Irrigation:** expensive but most efficient; water distributed close to the plants roots
- **Spray irrigation:** water is sprayed all over a field
- **Furrow irrigation:** type of surface irrigation using trenches; causes water loss
- **Salinization:** salt remains in soil after water evaporates.

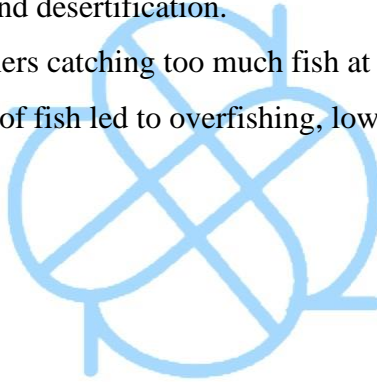
Pest Control Methods

- **Pesticides:** Controls pests such as plants, animals, and insects
- **Herbicides:** toxic pest control that kills unwanted plants
- **Insecticides:** kills insects; decreases the bee population that are pollinators
- **Fungicides:** kills fungi
- **Rodenticides:** kills off mice, rats, squirrels, etc.

Meat Production Methods

- **CAFO's:** Industrial production where animals are close together during the feeding.
 - Used for Pork, Poultry, and Lamb.

- **Pros**
 - Allows farmers to raise a large amount of animals at once
 - more jobs
- **Cons**
 - Different types of pollution
 - Groundwater waste
 - Greenhouse gases
 - Antibiotics are used
- **Free Range Farming:** Animals run wild and not fenced
 - Pros: Free from antibiotics and healthier
 - Cons: More expensive and more waste
- **Overgrazing:** Animals consume faster than the plants can regrow, which leads to soil erosion, vegetation loss, and desertification.
- **Overfishing:** Issue of fishers catching too much fish at once, causing the fish population to decrease. Management of fish led to overfishing, lowering the health of the fish in the water.



Mining

- **Impacts of Mining**
 - Extraction or removal of minerals that can be valuable.
- **Types of Mining**
 - Open pit mining, strip mining, Mountaintop removal, Underground mining
- **Mining waste:** Mining techniques such as Coal Mining destroys natural habitat, groundwater and land water, and produces a lot of methane gases.
 - Process is expensive and hazardous.

Impacts of Urbanization

- Increasing the number of people in inner cities causes more changes in developing places.
 - Ex. Economic impacts, employment growth, and schooling.
- Natural cycles affected:
 - **Water Cycle:** decreases amount of available groundwater

- **Nitrogen Cycle:** influences plant growth by increasing Nitrogen in soil
- **Carbon Cycle:** increase of burning fossil fuels
- **Urban Sprawl:** Urban growth continuously spreads into rural areas, which leads to loss of habitat, pollution, and water loss.

Ecological FootPrints

- Biological impact humans have on land and water.
- Often relates to water waste, proper disposing, gas use, food consumption, etc.

Sustainability

- **Environmental Sustainability:** humans utilizing natural resources, so they can be used in the future
- **Sustainable Yield:** amount of food that can be harvested without decreasing the food supply

Methods to Reduce Urban Runoff:

- **Urban runoff:** rain and snow that is directed out of cities and absorbed into the ground.
 - Usually channels into large bodies of water.
- **Mitigation:** increasing water infiltration, replacing concrete and pavement with more holes in the area.

Integrated Pest Management (IPM)

- controls pests
- **Physical control:** prevents pests from entering a area
- **Chemical control:** use of synthetic chemicals
- **Intercropping:** growing 2 crops at the same time in the same place
- **Biological control:** uses insects to control pest
- **Rotating crops:** control weeds and pest

Sustainable Agriculture

- **Contour Plowing:** follow natural contours of the land when plowing
- **Terracing:** cut out flat sections in hilly areas.
- **Windbreaks:** planting rows of trees with crops to reduce soil erosion.

Aquaculture

- Farming of fish, aquatic plants and many other saltwater and freshwater species.
- Used as a more efficient way to keep populations of fish and other species healthier and stable. It is an economic boost and helps species that may be endangered.
 - Con: the mixture of fish can cause waste or damage the habitat.

Sustainable Forestry

- **Reforestation:** replanting trees
- **IPM:** controlling different pests
- Reusing wood for different uses or causes.
- **The Urban Tree Project:** A reforestation project in the United States that's helping to fight climate change and preserve biodiversity.