

# Chapter 3

Risk, Economics, and Environmental Concerns

760,000 deaths/year of children under the age of five caused by diseases linked to poor sanitation



Dysentery, Cholera and Typhoid  
(water-borne diseases).

# What's the barrier?

- ▶ Economics: governments with many poor people cannot afford to shift funding to provide water and sanitary facilities.



# Risk assessment

- ▶ Risk: probability that a condition or action will lead to an injury, damage, or loss.
  - ▶ Probability: how likely is it?
  - ▶ Consequences: how catastrophic could a negative outcome be?
  - ▶ Cost: How much would it cost to deal with a negative outcome?

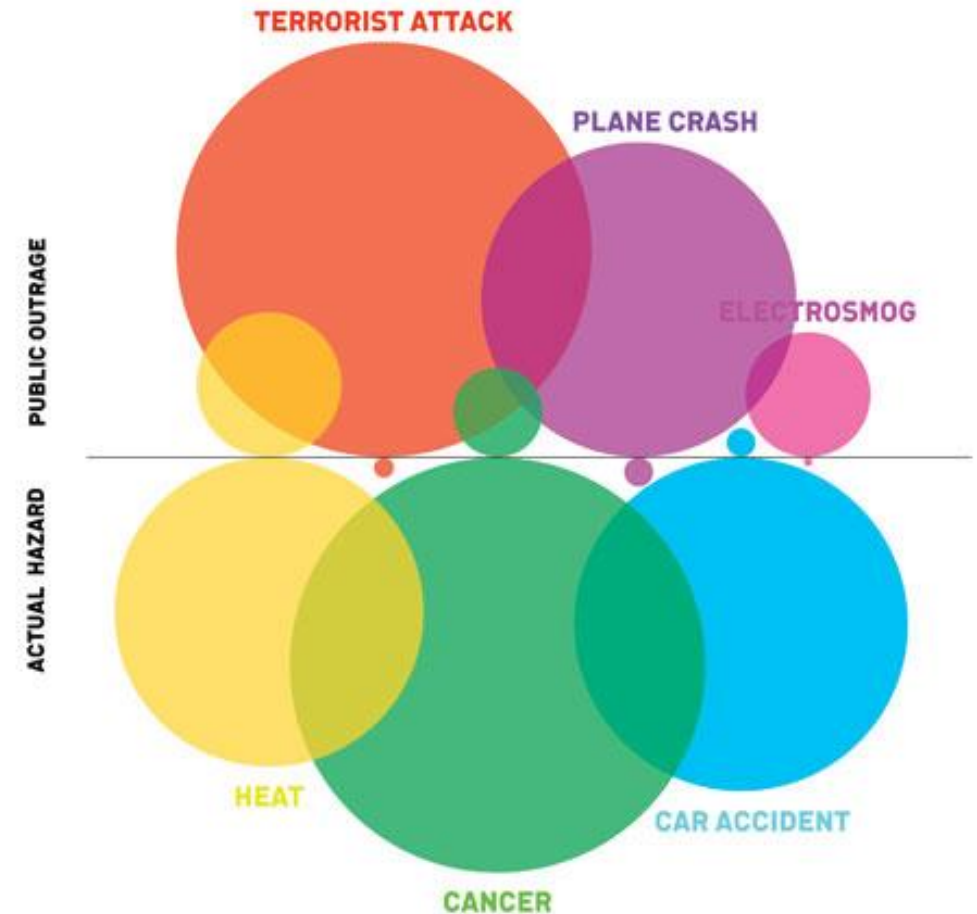
# Risk Management

- ▶ Uses risk assessment to make decisions
  - ▶ 1. Evaluating scientific info.
  - ▶ 2. Deciding limit of acceptable risk
  - ▶ 3. Deciding priorities
  - ▶ 4. Best benefit for least \$
  - ▶ 5. How plan will be enforced and monitored

# Scientific and public perceptions may not match

Peter M. Sandman

## RISK PERCEPTION AND ACTUAL HAZARDS



# Round Table Consensus: Renewable vs. Nonrenewable Resources

- ▶ 1. One piece of paper only
- ▶ 2. One pencil or pen only
- ▶ 3. If all agree, write it
- ▶ 4. Pass paper around



Renewable



Not sure



Nonrenewable

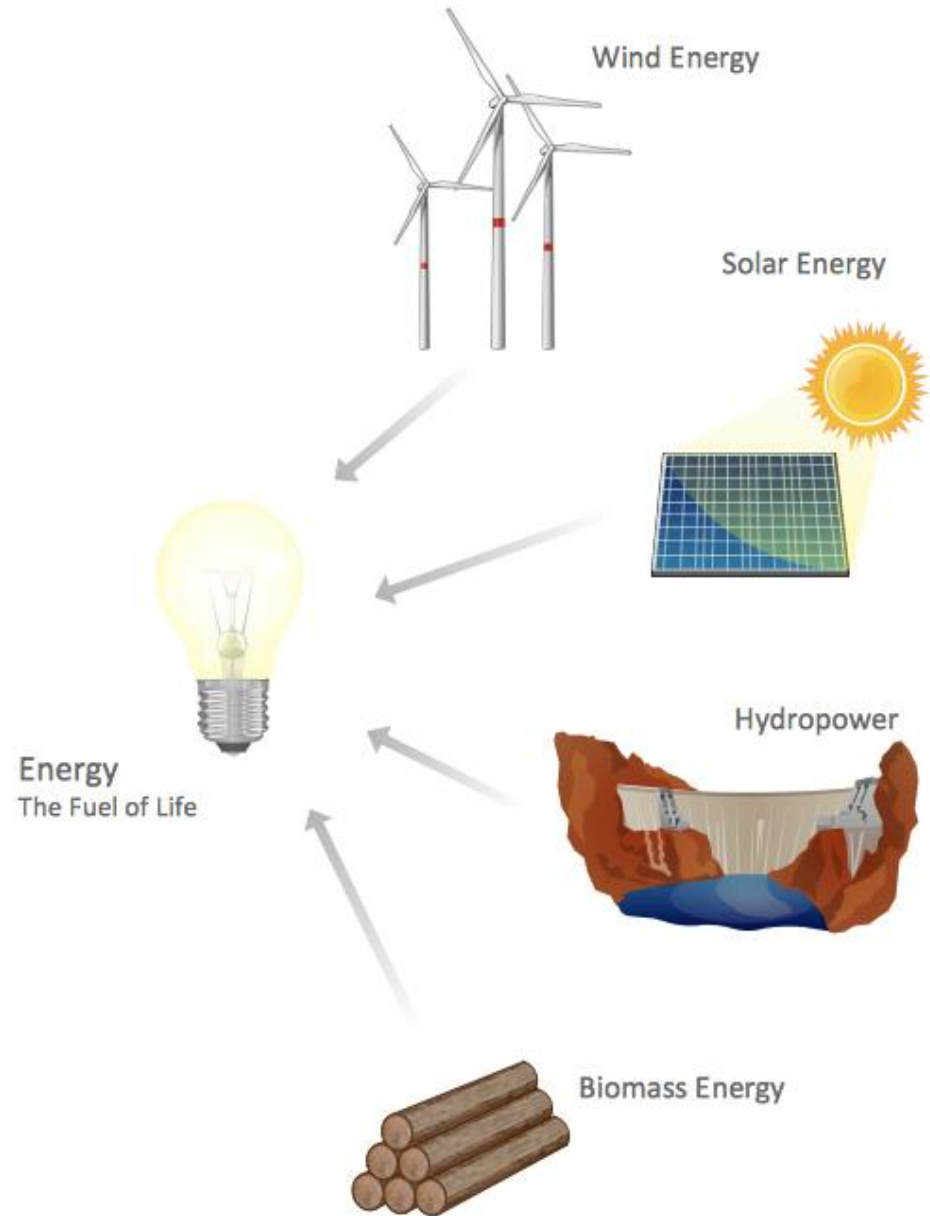


## Resources:

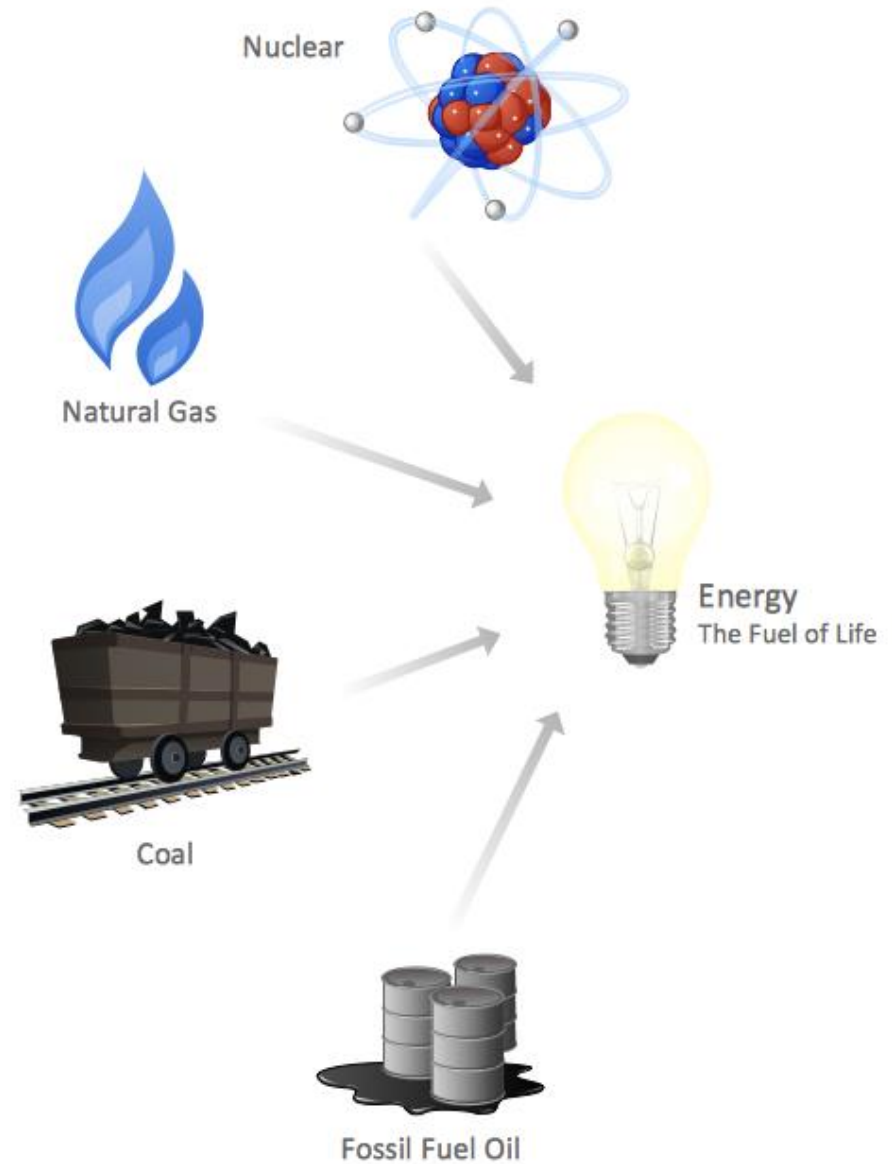
- ▶ Natural resources: structures and processes that humans can use but cannot create.
- ▶ Renewable resources: can be formed or regenerated by natural processes (but, can be overused and degraded: soil, water, air).
- ▶ Nonrenewable: not replaced by natural processes (iron, fossil fuels etc.)



## Renewable Energy



## Non-Renewable Energy



# Environmental costs

- ▶ Difficult to assign dollar value to ecosystem services
- ▶ Deferred costs: ignored, not recognized or effects accumulate slowly and need to be paid later. Think of an example.
- ▶ External costs: responsibility of someone other than who produced or consumed. Example: coal factory built can create jobs but pollution affects public



▶ Opportunity costs: occur when a decision precludes other potential uses

▶ Example: mining on farmland instead of farming.



Pollution: addition of matter of energy that degrades the environment for organisms.



Costs: health care, clean-up, prevention etc.



**\*Noise Pollution:** sound at levels high enough to cause physiological stress and hearing loss

- ▶ **Examples of sources:** transportation, construction, domestic and industrial activity.
- ▶ **Examples of effects on animals:** stress, masking of sounds used to communicate or hunt, damaged hearing, changes in migratory routes.



# Cost-benefit analysis:

- ▶ Calculates the costs and benefits of a project or course of action, to decide if benefits outweigh the costs
- ▶ Which act mandates cost benefit analysis for government supported projects?
- ▶ Not clear-cut. For example, which is more valuable: A hiking trail or a trail for motor bikes?



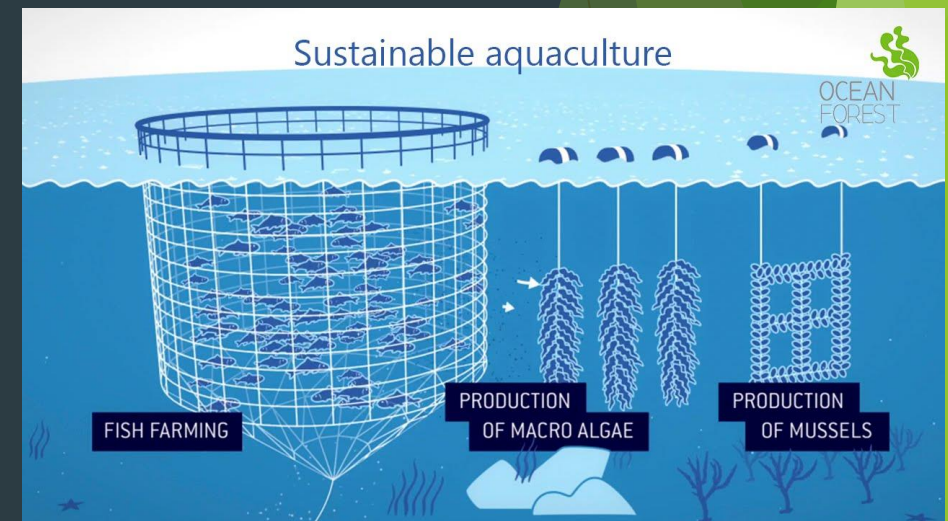
# Tragedy of the Commons

- ▶ With shared ownership, there is a strong tendency to overexploit (think competition)
  - ▶ Examples: ocean fishing, minerals, shared pasturelands



# Aquaculture: rearing of aquatic animals or the cultivation of aquatic plants for food.

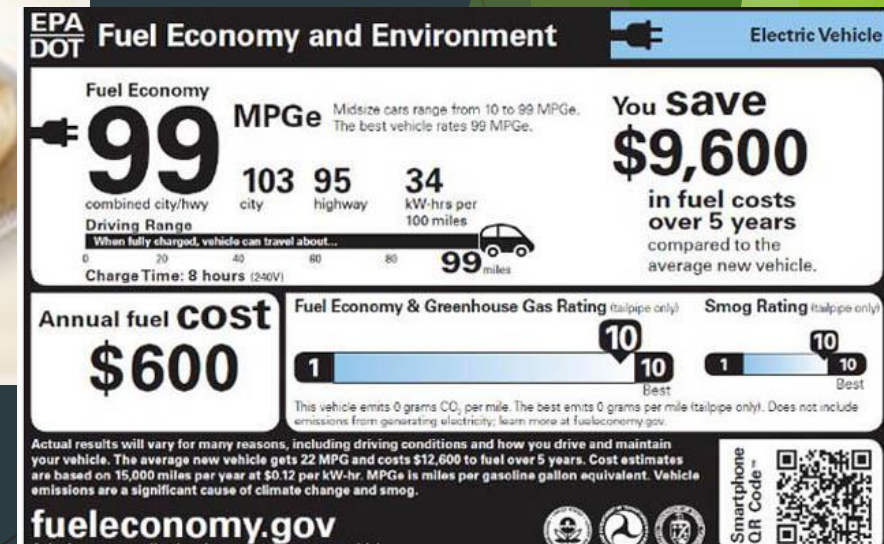
- ▶ Benefits: Highly efficient, requires small areas of water and little fuel
- ▶ Drawbacks: Can contaminate wastewater, escaping fish may compete or breed with wild fish, higher density can increase disease which can be transmitted to wild fish.





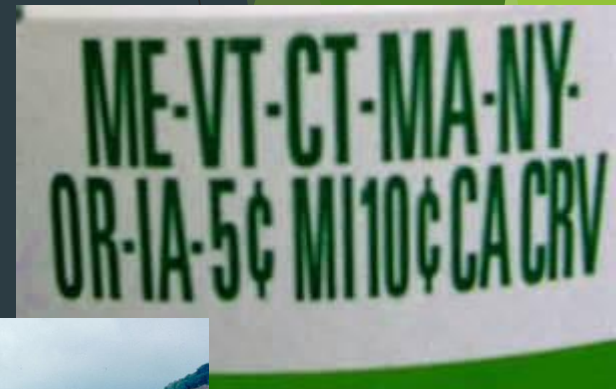
# Economic tools to address environmental issues

- ▶ Subsidies: gift from the government to encourage actions (tax rebates, low-interest loans etc.)
- ▶ Market-based instruments: allows for choice of solution based on cost of pollution-causing activity.
  - ▶ Information programs:



# Market-based Instruments continued.

- ▶ Tradable emissions permits: companies allowed to emit certain amounts of pollutants and can sell “extra” or bank them for future.
- ▶ Emissions fees and taxes: make it more expensive to be environmentally damaging
- ▶ Deposit-refund programs:
- ▶ Performance bonds: fees collected and returned after performance standards are met.



# Life Cycle Analysis and Extended Product Responsibility

- ▶ Life cycle analysis: process of assessing the environmental effects associated with the production, use, and disposal of a product over its life (from materials to disposal).
- ▶ Extended product responsibility: producer is responsible for all negative effects all the way to disposal.
  - ▶ No US legislation but “take-back” program for batteries etc.



# Sustainable Development

- ▶ Meets the needs of the present without compromising the ability of future generations to meet their needs.
  - ▶ 1. Renewability: A community must use renewable resources no faster than they can replace themselves.
  - ▶ 2. Substitution: Use renewable instead of nonrenewable whenever possible.
  - ▶ 3. Interdependence: A sustainable community recognizes that it's part of a larger system (attention to imports and exports).
  - ▶ 4. Adaptability: Can adapt and uses research and development.
  - ▶ 5. Institutional commitment: Adopts laws that mandate sustainability.