Common Pool Resources

Old English towns often had a ‘commons’ – A shared field for grazing stock

Residents realized they would make more money if they increased their stock on the commons
– So the number of animals on the commons grew
– And grew, and grew, and grew
– Until the grass was eaten, and the animals starved, and the people were ruined


The Tragedy of the Commons

When there is a common resource available to all, everyone has an incentive to use too much

The theoretical result is that they ruin it

The Tragedy of the Commons & Capitalism

The tragedy is made worse by capitalist competition
– To stay in business, you need to make the same profits as your competitors
– If you don’t join them in over-using the commons, you will lose your business
– If your competitors produce beef for 63¢ a pound, and you produce it for 74¢, you will get no customers

Modern, textbook capitalism is worse because it is individualistic

Society has many Commons

Western range lands
– Cattle grazing on public land
– Buffalo hunting (nearly to extinction)
– Passenger pigeons (to extinction)

Rivers, streams, oceans
– Water takes away sewage, garbage, industrial waste

Fish
– Fish are jointly owned; why not catch as many as you can?

National forests
– Why not cut down more trees than a sustainable harvest would yield?

Air
– Factories dump pollutants into the air
– Greenhouse gases
Types of Common-Pool Resources

- Property owned by a collection of people
  - The original commons in Garrett Hardin’s paper
  - Communal farms in the Soviet Union

- Property owned by the government
  - Government forests used for timber
  - Government range lands - Forest Service & BLM
  - Navigable rivers and lakes

- Property owned by no one
  - The air, oceans, range lands in the old West

Prisoners’ Dilemma

<table>
<thead>
<tr>
<th></th>
<th>Not confess</th>
<th>Confess</th>
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</thead>
<tbody>
<tr>
<td>Not confess</td>
<td>1 year each</td>
<td>B gets 10 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A goes free</td>
</tr>
<tr>
<td>Confess</td>
<td>B goes free</td>
<td>8 years each</td>
</tr>
<tr>
<td></td>
<td>A gets 10 years</td>
<td></td>
</tr>
</tbody>
</table>

Prisoners' Dilemma

- See Anatol Rapoport and Albert M. Chammah, Prisoner's Dilemma (1965); Game Theory and Experimental Economics (1982); Elinor Ostrom, Governing the Commons (1990)

Limitations on the Tragedy Metaphor

- The tragedy metaphor assumes that people are myopic
  - People are assumed not to recognize the consequences of their behavior
  - They are shallow & unobservant

- The tragedy metaphor assumes that people engage in totally self-interested behavior
  - They ignore their impact on others

Limitations on the Tragedy Metaphor

- The tragedy game assumes that people cannot communicate with one another
  - The prisoners’ dilemma assumes that prisoners are put in separate cells & cannot communicate

- The Tragedy of the Commons game also assumes no communication among farmers

Farmer A

<table>
<thead>
<tr>
<th></th>
<th>Cooperate</th>
<th>Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperate</td>
<td>Both earn $10</td>
<td>A earns $15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B earns $2</td>
</tr>
<tr>
<td>Defect</td>
<td>A earns $2</td>
<td>B earns $15</td>
</tr>
<tr>
<td></td>
<td>Both earn $4</td>
<td></td>
</tr>
</tbody>
</table>

Tragedy of the Commons Game

- The tragedy game assumes that people cannot communicate with one another
- The prisoners’ dilemma assumes that prisoners are put in separate cells & cannot communicate
- The Tragedy of the Commons game also assumes no communication among farmers
Some CPR Tragedies Occur

- Passenger pigeons & other species extinct
- Sardine fishery on West Coast destroyed
- Mercury levels in many fish species are growing
  - Air as a garbage dump for power plants
- Water tables in western U.S. are falling
  - MINK states, Arizona
- Global climate change

Other CPR Tragedies are Avoided

- Air is getting cleaner
- Wolves, bison, bald eagles & other endangered species were almost wiped out, but are now partly restored or stabilized
- The ozone hole seems to be on a path toward shrinking
  ⇒ Why success or failure?

Tragedy Game Error

- Recent research indicates that two key elements may prevent the tragedy:
  1. Communication among players
  2. Ability to punish

Solving Common-Pool Resource Problems

1 Private associations
  - Users or owners can work together for a solution

2 Yield controlling power to a higher authority
  - Command & control solutions
    - Regulations & sanctions for people who violate the rules

3 Establish a system of property rights
  - Market-based solutions
    - Give rights to users: Property, management rights, ...

Private Associations

- Formal associations
  - Homeowners association
  - A town that owns a common pasture
    - Lexington Common
- Informal associations
  - Western ranch lands before gov’t control
  - Communities of farmers who share a river as their source of water

Conditions for Solving CPR Problems with Private Associations - 1

- Clearly defined boundaries
  - What are the CPR boundaries
  - Who can use the CPR
  - Open vs. Limited Access
- Rules must fit local conditions
  - Restrictions on time, place, technology or quantity of resources taken or used
  - Requirements for contributions of time, work, materials, money, etc.
  - Outsiders (e.g., academics, govts) often make mistakes

Principles are from Elinor Ostrom, Governing the Commons, chap 3
Most or all individuals affected by rules are allowed to participate in modifying the rules—
- Users, owners often join in democratic decision-making
  - e.g., Ranchers elect council to establish grazing rules
- This brings in local expertise
- Difficult to accomplish if the user/owner group is not homogeneous
  - Racial, ethnic, religious differences are problems
  - Differences in wealth or political influence are problems

Monitors, who check CPR status & user behavior, are accountable to users/owners—
- Users/owners monitor themselves or hire monitors
- Monitors set overall harvests, etc.
- Monitors catch cheaters
- Accountability to the government would be a gov’t solution
- Local accountability keeps the monitors in check

Monitors set overall harvests, etc.—
- Monitors catch cheaters
- Accountability to the government would be a gov’t solution
- Local accountability keeps the monitors in check

Graduated sanctions for those who violate rules—
- Sanctions must fit the violation
  - Minor sanctions for first offenses, harsher for repeats
  - Lesser sanctions for offenders in desperate situations, ...
- Conflict resolution venues must be developed
  - Rapid, low-cost mechanisms for adjudicating disputes
    - Among user/owners
    - Between accused rule-breakers & authorities

Right to establish associations is not blocked by government authorities—
- Governments can be hostile to the efforts of private associations
- A politically powerful user/owner may persuade the gov’t to block the association

Large CPR problems are solved with “nested associations”—
- Local associations cooperate in networks of larger and larger, umbrella associations

Note: these principles are from Elinor Ostrom, Governing the Commons, Chap 3

Homestead Act (1862) gives settlers right to 160 acres—
- Act works for Midwest farmers, not western ranchers
- Law drives ranchers to homestead a base ranch & unofficially take over surrounding range lands

Had the law fit the ranchers’ needs, we would have private ownership of most western land

Alan Ladd
Shane (1953)

Clint Eastwood
Pale Rider (1985)
When ranching spread across the West
- Some disputes were settled with guns
- Guns are inefficient & risky, so private agreements developed: ranchers agreed on grazing rules
- Private associations developed (“institutions”)
- Local ranchers are members with voting rights

Rules fit local conditions
- Mountain valleys might be divided, one to a rancher
- Open plains might allow mixed herds with brands

Monitors (sheriffs) were needed to prevent cattle rustling
- Some disputes were settled with guns
- Hiring sheriffs was safer & cheaper

Local courts (at first, unofficial) settled disputes
- Local “courts” started shortly after immigrants arrived, and before state & federal govt arrived
- Disputes over rustling, changing brands, grazing areas

Local courts used appropriate punishments, or “graduated sanctions”

State & Federal govts stayed out at the beginning
- The system was established in the 1800s, long before the Forest Service or BLM were established

Federal rules largely accepted the system
- Grazing permits
- Local advisory councils set rules

When “outsiders” such as sheep herders or farmers appeared, the associations resisted them
- The associations tried to act like governments
- They tried to maintain control, sometimes with the use of force
- As a result, the real govt entered
Environmental damage to the ranges was ignored
- Cattle eat selectively
  - They eat the tasty plants first
  - Changing the ecosystem
- Cattle drink lots of water
  - Harming competing species
- Cattle compact the soil
  - 700-1,000 pounds destroys riparian areas around creeks and lakes

**Solving CPR Problems with Private Associations - Limitations**

**Solving CPR Problems with Private Associations - Success?**

**Solving Common-Pool Resource Problems**
1 Private associations
   - Users or owners can work together for a solution

2 Yield controlling power to a higher authority
   - Command & control solutions
     - Regulations & sanctions for people who violate the rules

3 Establish a system of property rights
   - Market-based solutions
     - Give rights to users: Property, management rights, ...

**Under What Circumstances do People Turn to Government Intervention?**

- Seeking Public or Collective Goods
- Externalities
- Natural monopolies
- Information rationales
- Moral imperatives
Public or Collective Goods
- Benefits to an entire society, which are not excludable
- One person’s use cannot prevent another person’s
- Production of public goods faces a free rider problem
- So the gov’t intervenes to assure production

Externalities: Costs or Benefits to Outsiders
- Private decision makers seek their own goals
  – Costs or benefits falling on others can be ignored
  – Negative externalities are the most common justification for gov’t intervention

Some Industries have Natural Monopolies
- If monopolies exist in essential commodities or services, the owners of the monopolies can charge unfairly high prices

Public Need for Information
- Markets work most efficiently when information is readily available to all
- Gov’t regulations requiring disclosure of information improve efficiency

Moral Imperatives
- The list above offers 5 reasons why people may want government intervention
  - They do not explain what it takes to get intervention or why it occurs in some cases but not others
    – We will discuss that later
Government Solutions for Solving CPR Problems

- Clearly defined boundaries
  - What are the CPR boundaries
  - Who can use the CPR: Open vs. Limited Access
- Rules must fit local conditions
- Individuals affected by rules are allowed to participate in modifying the rules
- Monitors: gov’t inspectors, regulators
- Sanctions for those who violate rules
- Conflict resolution venues
  - Administrative courts or judicial courts

Private Associations vs. Government

- To solve CPR problems you need a system with the characteristics on Ostrom’s list
  - Private associations must mimic government
- Governments have power
  - Police, courts, fines or prisons
- Association members need to agree among themselves to establish a governance system

Solving Common-Pool Resource Problems

1. Private associations
   - Users or owners can work together for a solution

2. Yield controlling power to a higher authority
   - Command & control solutions
     - Regulations & sanctions for people who violate the rules

3. Establish a system of property rights
   - Market-based solutions
     - Give rights to users: Property, management rights, ...

Private Property Solution

- Transferring public property to private owners resolves some aspects of the Tragedy
  - Private owners should take better care of their own property than common property
  - They wants profits, but not to reduce the value of their property

Private Property - Limits

- The argument works well for the specific problem identified as the tragedy of the commons
  - Over use of property can destroy its value
  - We assume long-term, value maximizing behavior
  - Owners will limit the number of animals grazing on a field in order to maintain its value

- But a property owner & an environmentalist may see it differently
  - Motivated reasoning leads to different conclusions

Frying Pan Lake
The argument works less well for property characteristics with non-monetary value.

Property owners may not share the values of people who want property protected:
- They may not value endangered species or aesthetic values such as views or undeveloped wilderness.

Some common pool resources cannot be made private:
- Air, oceans, rivers are common pool garbage dumps.

Property owners may not be long-term profit maximizers:
- Competition may drive users to harm their property.
  - e.g., price cutting from competitors.
- Owners in financial trouble may need short term cash.

Private associations
- Users or owners can work together for a solution.

Yield controlling power to a higher authority
- Command & control solutions
  - Regulations & sanctions for people who violate the rules.

Establish a system of property rights
- Market-based solutions
  - Give rights to users: property, management rights, ...

All three solutions require “collective action”:
- People working together.
- Working in private associations.
- Working to get gov’t to take over.
- Working to make gov’t transfer property to private owners.

Collective goods dilemmas occur when:
- Paying a fair share of the good is in the interest of a majority.
- But voluntarily paying that share is not in the interest of individual people.
- People would rationally rather be “free riders”.

Result: No public good.
Consider Collective Goods

- Collective, or public, goods are benefits freely available to everyone
  - Not just group members
  - Clean air
  - Low crime rate
  - National defense
- Who pays for collective goods can be a serious problem

The Decision to Participate

The Decision to Participate (Gambling Example)

\[
\text{Expected Return} = \text{Value of Pot} \times \text{Probability of winning} - \text{Cost of Bet}
\]

<table>
<thead>
<tr>
<th>Probability of winning</th>
<th>Value of Pot</th>
<th>Cost of Bet</th>
<th>Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10</td>
<td>$100 Pot</td>
<td>$5</td>
<td>Expected Return: $5 gain</td>
</tr>
<tr>
<td>1/10</td>
<td>$100 Pot</td>
<td>$20</td>
<td>Expected Return: $10 loss</td>
</tr>
</tbody>
</table>

Consider a firm’s calculations

How do we we maximize profits?

- Spend on improving efficiency, productivity?
- Spend on lobbying?
- Which yields more profit?

Enron Calculations?

- ExxonMobil gave $13 million in campaign donations in 2013
  - The lobbying operation cost millions
- Retrofitting a single power plant would cost \textit{tens of millions} of dollars
- Investing in lobbying is usually a good business decision

Citizen Lobbyist Calculations?

- Trip to Washington (hotel, meals, airfare) costs $3,000
- Benefit of winning is large, but probability of \textit{personally affecting the outcome} is tiny
- Investing in lobbying may be a poor personal choice
Group Size and Participation

- **Small groups**: Benefits often exceed costs
  - Basketball team
  - Business groups (e.g., Oil & Gas industry)

- **Large Groups**: Benefits rarely exceed costs
  - U.S. Taxpayers
  - Consumer groups
  - Environmental groups

Group Size: Are Small Groups Bad?

- Beware of assuming that narrow, economic groups are bad

- Conservatives:
  - Being in business isn’t bad
  - Few Enrons in the U.S.

- Liberals:
  - Ranchers, farmers, fishers are mostly low-income
  - The Navaho

Solutions to Collective Goods Dilemmas - 1

- Mandatory participation
  - Gov’t forces people to pay taxes
  - Union contracts require workers to join unions
  - Draft soldiers to fight in Vietnam

- These generally do not apply to environmental problems

Solutions to Collective Goods Dilemmas - 2

- Selective incentives
  - Magazines, vacations for Sierra Club members
  - Praise from friends & community leaders
  - Being part of a movement
  - Reputation

- Selective benefits are critical

Group Size Result

- Narrow, economic interests are always represented

- Broad public interests are poorly represented

- Who does Congress serve?
  - Narrow, economic interests or the voters?

Assurance Game (payoffs to individual)

<table>
<thead>
<tr>
<th>Group</th>
<th>Cooperate/Win</th>
<th>Defect/Lose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Join</td>
<td>Join</td>
<td>Stay home</td>
</tr>
<tr>
<td>Public good</td>
<td>Public good</td>
<td>No public good</td>
</tr>
<tr>
<td>+ selective</td>
<td></td>
<td>- cost of participation</td>
</tr>
<tr>
<td>benefit - cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stay home</td>
<td>Public good</td>
<td>No public good</td>
</tr>
</tbody>
</table>

See Dennis Chong, *Collective Action and the Civil Rights Movement*, chap 3
Reputation can be a powerful selective benefit

Movements & campaigns can offer serious benefits

Leaders may call upon their followers to risk everything for a cause

Leaders assure followers that they will win

That is their key job in mass movements

Leaders can miscalculate, of course, and then they & their followers lose

Cooperation is not a guarantee of victory

Entrepreneurs may provide a key ingredient needed to solve collective goods dilemmas

They invest lots of their time & effort

If they win, they gain special selective benefits

If we are marked to die, we are now
To do our country loss; and if to live,
The fewer men, the greater share of honour
God's will! I pray thee, wish not one man more.

He that outlives this day, and comes safe home,
Will stand a tip-toe when this day is named,
And cause him at the name of Crispian,
He that shall live this day, and see old age,
Will yearly on the vigil feast his neighbours,
And say 'To-morrow is Saint Crispian'
Then will he strip his sleeve and show his scars,
And say 'These wounds I had on Crispian's day.'

We few, we happy few, we band of brothers;
For he today that sheds his blood with me
Shall be my brother; be he ne'er so vile,
This day shall gentle his condition;
And gentlemen in England now-a-bed
Shall think themselves accurs'd they were not here,
And hold their manhoods cheap whiles any speaks
That fought with us upon Saint Crispin's day.

— King Henry V, before the battle of Agincourt
Media Attention & Agendas

- Key to launching a successful campaign or movement: Media attention

- Catastrophic events
  - Santa Barbara oil spill, Gulf oil spill
  - Hurricane Katrina

- Media strategies
  - Earth Day
  - Birmingham and Selma, Alabama

Tragedy of the Commons & Public Awareness

- If the Commons slowly degrades & no one notices, the problem can steadily get worse
  - Chronic conditions w/o crisis get out of control, and the public doesn’t notice

- If the Commons rapidly collapses, the public is more likely to notice
  - Crises draw public attention, making it easier to solve problems
  - Getting issues on the public agenda is a key

Chronic Problems vs. Crises

- Crises draw public & political attention

  Deepwater Horizon oil spill
  April 20, 2010

Chronic Problems vs. Crises

- Chronic problems draw less attention

  Overfishing