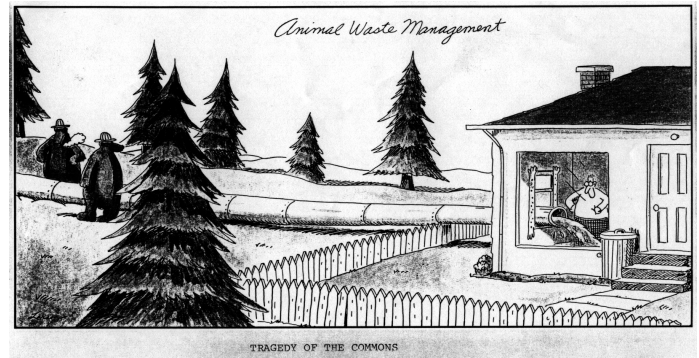


Conservation

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Does conservation happen naturally?

Jean-Jacques Rousseau (1712–1778) Humans are good by nature but corrupted by society.

- ▶ Contemporary view that native peoples tend to conserve resources.
- ▶ That environmental problems are an artifact of modern states.

Famous quote of Chief Seattle of Duwamish Indians, 1854

How can you buy or sell the sky? The land? The idea is strange to us. . . Every part of this earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark woods, every meadow, every humming insect. All are holy in the memory and experience of my people. . . This we know: the earth does not belong to man, man belongs to the earth.

But Chief Seattle never really said this. It was written for TV in 1971.

Island extinctions

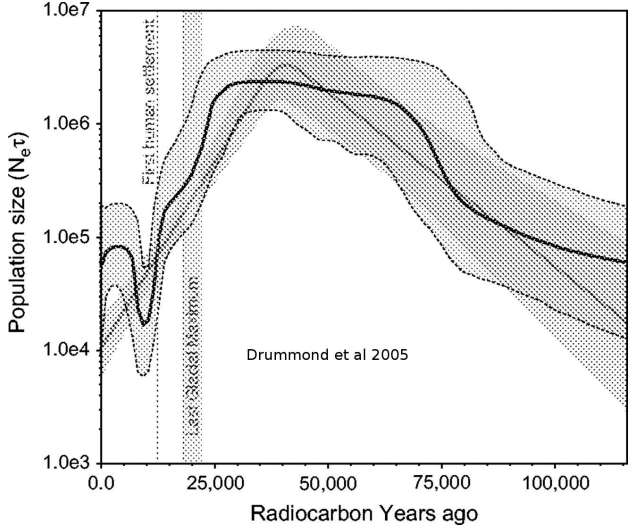
Each time humans have colonized an island, a wave of extinctions has ensued.

- ▶ 50% of New Zealand's birds disappeared
- ▶ Giant lemurs and elephant birds: Madagascar
- ▶ Flightless geese: Hawaii
- ▶ 20% of world's bird species: Pacific islands

Continental extinctions at end of Pleistocene

- ▶ N America: 73% of large mammal genera disappeared
- ▶ S America: 80%
- ▶ People argue about causes: the climate changed too.

Estimated Size of Bison Population

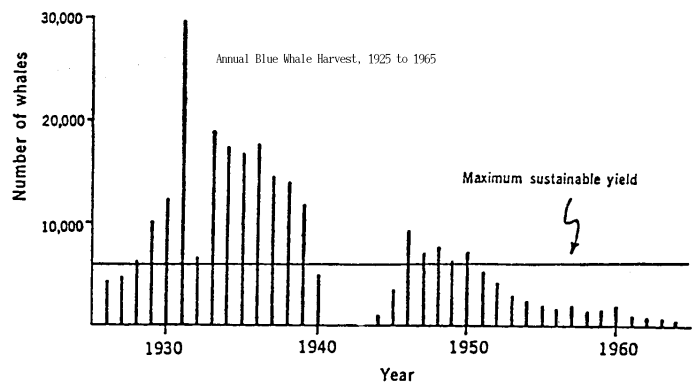


Yonemamo (Hames) & Piro (Alvard)

- ▶ Game depleted in region around village.
- ▶ Conservationists would avoid killing game in depleted region.
- ▶ Yonemamo and Piro showed no such reluctance.

- ▶ Not clear what killed Pleistocene megafauna.
- ▶ But humans have caused many extinctions.
- ▶ And modern native peoples are not conservationists either.
- ▶ Are we any different?

Annual Blue Whale Harvest, 1925–1965

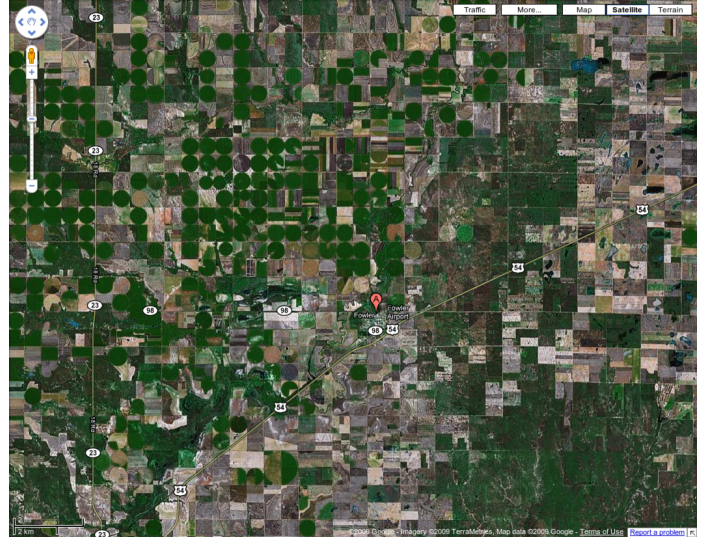


Tragedy of the Commons (Hardin)

- Humans are not natural conservationists.
- ▶ Tragedy of the commons
- ▶ Discounting the future

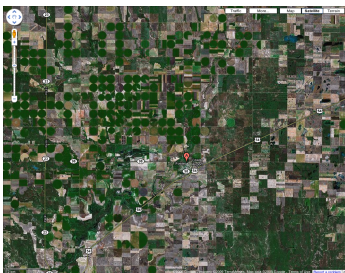
- ▶ Commons: a collectively owned resource.
- ▶ Consider a pasture owned by village.
- ▶ Each additional sheep reduces the available grass.
- ▶ Damage to pasture is shared, but benefit goes to owner of sheep.
- ▶ Overgrazing ruins pasture.

Artesian Valley, Kansas



- ▶ Suppose I limit size of my herd.
- ▶ Allows others to increase *their* herds.
- ▶ Commons is still ruined, but I am worse off.
- ▶ No incentive to conserve in a commons.

Artesian Valley, Kansas



80 years ago

Hundreds of natural springs.
Marshes and streams.
Shallow wells produced water.

Today

Marshes & streams dry.
Wells deeper and deeper
as irrigation depletes aquifer.

Cause

No one has incentive to reduce
consumption
Would just leave more for others.

Looting in Baghdad

- ▶ After US invasion, looting began.
- ▶ Bad for everyone: destroyed schools, hospitals, etc.
- ▶ But if I refrain from looting, that just leaves more for the others.
- ▶ I might as well get what I can.

Littering

- ▶ Bad for everyone.
- ▶ But it doesn't help for *one* individual to refrain.
- ▶ If others litter, I might as well.

General principle

- ▶ When a resource is held in common, there is a tendency to over-exploit.
- ▶ No individual can gain by resisting this tendency.

- ▶ Is this bleak message really true?

Ridley's examples of well-run commons

- ▶ Maine lobster-trapping gangs
- ▶ Medieval commons

Ridley argues that these cases conserve common resources because individuals have property rights.

A poorly run commons: Chaco Canyon



- ▶ Originally forested.
- ▶ Forest cut for firewood and roof beams.
- ▶ Erosion lowered water table.
- ▶ Valley abandoned by 1300 AD
- ▶ Today: a desert, with empty towns.

Ridley's view

- ▶ People deplete mobile resources because they are hard to own. (Yet the trees in Chaco Canyon weren't mobile.)
- ▶ Local management is good; governmental management bad.

Why does local control work better in Ridley's examples?

Don't know. Here are some thoughts:

- ▶ Legitimacy: in many LDCs, people don't feel the government represents them.
- ▶ Benefits of conservation returned to local people.

Where does this leave us?

- ▶ Sometimes people manage to police themselves for mutual benefit, and sometimes they fail.
- ▶ Why and under what circumstances?
- ▶ Best studied in laboratory.

Public Goods Experiments

Each subject is given several tokens, which can either be kept or invested in a "group project."

- ▶ Experimenter pays 10 cents for each token kept.
- ▶ Pays 20 cents per token in group project, shared equally by all players.

Played with 4–10 subjects.

<p>Eleanor Ostrom's public goods experiment</p> <ol style="list-style-type: none"> 1. 10 rounds of game 2. Intermission: subjects are given a few minutes off, during which they are allowed to talk among themselves. 3. another 10 rounds of game 	<p>Results</p> <p>Before intermission: Contributions to group exchange decline from 40% in period 1 to 10% in period 10. After intermission: Contributions to group exchange start high and remain high for all 10 rounds.</p>
<p>This experiment (and other similar ones) have shown</p> <ul style="list-style-type: none"> ▶ Communication facilitates cooperation. ▶ Punishment facilitates cooperation. ▶ Reputation facilitates cooperation. ▶ Cooperation breaks down when there is a chance the resource will be destroyed. 	<ul style="list-style-type: none"> ○ Humans are not natural conservationists. ○ Tragedy of the commons ▶ Discounting the future
<p>Discounting the future</p> <ul style="list-style-type: none"> ▶ Suppose I own a woodlot. ▶ Should I conserve the trees, or cut them down and sell them? ▶ The answer depends on my goals: <ul style="list-style-type: none"> Conservation Preserve the trees. Profit We need more information. 	<p>Growth rate versus interest rate</p> <ul style="list-style-type: none"> ▶ Suppose the trees grow at 1% per year, but interest rate is 2%. ▶ If I preserve the trees, my investment grows at 1%. ▶ If I cut them down, sell them, and invest the proceeds, it grows at 2%. ▶ 2% is better than 1%. ▶ If interest rate exceeds trees' growth rate, profit motive says cut them down. ▶ Private ownership does NOT guarantee conservation. <p style="text-align: right;">(Colin Clark)</p>

<p>Time preference</p> <ul style="list-style-type: none"> ▶ Would you rather have \$100 today, or next year? ▶ All normal people prefer benefits sooner rather than later. ▶ Economists call this “time preference.” 	<p>Time preference above and beyond the interest rate</p> <ul style="list-style-type: none"> ▶ \$100 today is worth more <i>objectively</i>. (I could invest it and have more money next year.) ▶ But this is not the only basis for time preference. We also have strong subjective preferences for immediate benefits.
<p>The pattern of discounting</p> <ul style="list-style-type: none"> ▶ Interest accrues at a constant rate. ▶ Yet subjective time preference declines rapidly at first, and then more slowly. <p>How do we know?</p> <ul style="list-style-type: none"> ▶ Would you rather have (a) \$10 right now or (b) \$11 next week? ▶ Would you rather have (a) \$10 in 52 weeks or (b) \$11 in 53 weeks? <p>If you discounted each week at the same rate, you would make the same choice (a or b) each time. Yet many choose “a” the first time and “b” the second.</p>	<p>Discounting over short time intervals</p> <ul style="list-style-type: none"> ▶ Would you rather have a small candy bar now, or a large one in 15 minutes? ▶ Many want the small one now. ▶ Does NOT reflect the interest market. ▶ We have an intrinsic preference for immediate rewards, (and so do rats and pigeons).
<p>Discounting and conservation</p> <ul style="list-style-type: none"> ▶ Conservation requires immediate sacrifice, but yields delayed benefits. ▶ Makes business sense only if the resource grows faster than the interest rate. ▶ Even if it does, our subjective preference for immediate benefits predisposes us against conservation. 	<p>Conservation faces two difficulties</p> <ol style="list-style-type: none"> 1. Tragedy of commons 2. Preference for immediate benefits <p>Is there hope?</p>

Experiment of Milinski et al (2006): Can we stabilize the climate?

- ▶ Anonymous subjects play in groups of 6
- ▶ Alternating rounds of "indirect reciprocity game" and "climate public goods game"
- ▶ Some subjects (the "well-informed" ones) were given a lecture by an expert on climate.

"Well-informed" subjects

Were given lecture by Managing Director of the Max Planck Inst for Meteorology, who summarized current knowledge about climate and recommended as follows: Some consequences of CO2 emissions—eg warming and sea level rise—cannot be prevented. Others can. You can help by: (1) slightly reducing room temperature in winter, (2) using public transportation instead of private cars, and (3) using renewable energies.

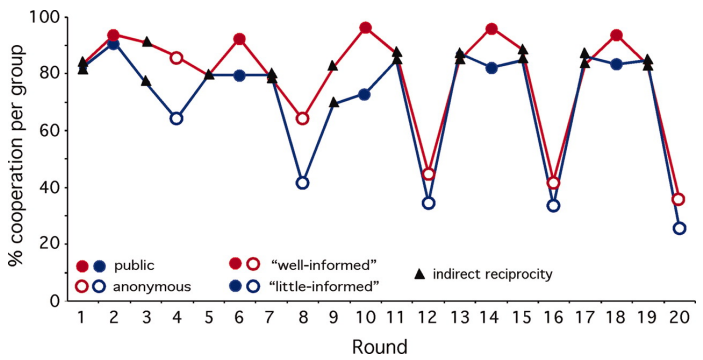
Indirect Reciprocity Game

- ▶ 6 anonymous players interact via computers.
- ▶ Experimenter asks "Telesto" whether s/he will give to "Galateo". If so, Telesto loses DM 2.50 and Galateo gains DM 4. Telesto's decision displayed on all screens.
- ▶ Next, experimenter asks Galateo whether he will give to Jivare.
- ▶ No direct reciprocity: if A is potential donor to B, then B is never potential donor to A.

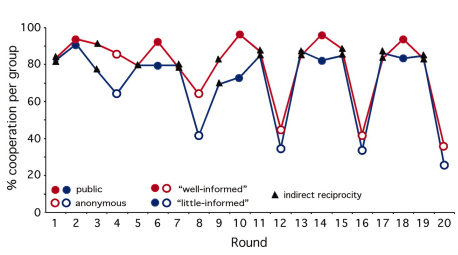
Climate public goods game

- ▶ Subjects asked simultaneously whether they will contribute 0, 1, or 2 euros to "climate pool."
- ▶ At end, climate pool from all groups was doubled and used to publish an ad in a big German newspaper.

Percent cooperation in Milinski et al, 2006

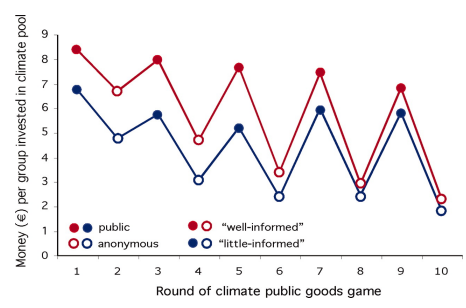


Percent cooperation in Milinski et al, 2006



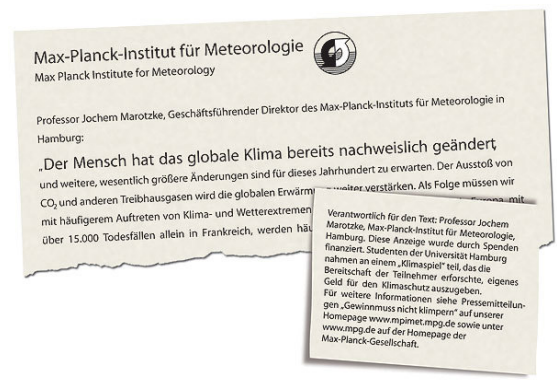
- ▶ Well-informed (red circles): slightly more cooperative.
- ▶ Public (filled circles): much more cooperative.
- ▶ We should make carbon emissions very public.

Contributions in Milinski et al, 2006



- ▶ Well-informed: slightly more generous.
- ▶ Public: much more generous
- ▶ We should make carbon emissions very public.

Milinski's Advertizement



Progress on climate change

- ▶ Until recently ExxonMobile opposed climate legislation.
- ▶ Also invested in natural gas, which makes 1/2 as much carbon pollution as coal.
- ▶ In 2013, ExxonMobil is largest US producer of natural gas.
- ▶ ExxonMobil now acknowledges that CO₂ causes climate change.
- ▶ Recognizes that climate change threatens its business.
- ▶ Supports carbon tax if paired with other tax cuts (Al Gore's policy). (NY Times 12/5/2013)

Summary

- ▶ Humans have been causing ecological disasters for centuries.
- ▶ Conservation doesn't come naturally to modern humans either.
- ▶ Tragedy of the commons: an argument that accounts for at least a part of the problem.
- ▶ We are most likely to solve such problems when we can communicate, punish, and form reputations.
- ▶ We are less likely to do so when the resource is ephemeral.
- ▶ Time preference: the other reason why conservation is difficult.
- ▶ We are more likely to conserve when conservation is public.