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SOCIETY

# Environmental Challenges: The Tragedy of the Collective

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LIBERTY  
& SOCIETY  
SERIES

3

Based on the lecture delivered by Parth J Shah at Liberty & Society Seminars and ipolicy courses since 2001.

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# LIBERTY & SOCIETY SERIES

**C**entre for Civil Society organises academic programs for students, professors, journalists, and NGO leaders all across India. At first, these courses were titled as Liberty & Society Seminars (LSS) for college students. CCS has since revised the program to focus more on public policy and its implications in India, renaming the program as ipolicy. These four-day residential courses engage students in vital issues of public policy, and in creating a new vision for India. They provide participants with a greater understanding of the larger world—society, economy, and culture—within a liberal framework, which emphasises limited government, individual rights, rule of law, free trade, and competitive markets.

Challenging conventional wisdom, coupled with the excitement of discovery provides participants a once in a lifetime experience. The success of these courses, in creating new thinkers and leaders brought forth the idea of publishing key lectures so that others could experience the intellectual adventure. The lectures are a synthesis of research studies and various arguments that are by nature polemical. This series seeks to make these stimulating lectures from various CCS programs available to a wider audience.

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## COMMON ENVIRONMENTAL PROBLEMS

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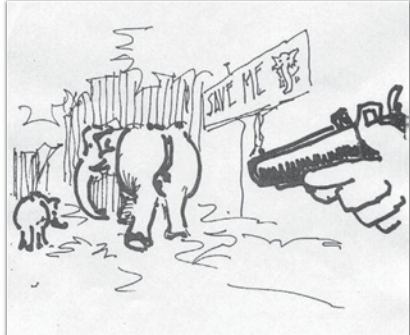
We face many environmental problems that have serious consequences. I'd like to show you some slides of environmental problems and have you identify what each one depicts.<sup>1</sup>



### Identify the Problem



### Identify the Problem





## Identify the Problem



Many people want to solve these problems without asking a fundamental question: Is there a common reason behind these problems? If we can find a root cause common to these problems, we might be able to create a solution. Think of all these examples, do they share one basic, underlying cause?

A common response to this question is that the resource in each case is 'limited' and that people are being 'irresponsible' and 'greedy.' People also complain that we take too much because there is 'overpopulation.' In short: 'we are too many and too greedy.'

If this were the cause, the solution would require us to reduce our numbers or change human nature. We would have to change everyone's behaviour to want much less, have fewer children, give up on most of their aspirations, and maybe even die for the good of the human race.<sup>2</sup> We would either have to succeed in persuading everyone to be sufficiently self-sacrificing to avert crisis, or impose draconian laws to strictly control everyone's behaviour.

But thankfully, the idea that we are too many and too greedy does not explain the problem. There are many limited resources that are not being exhausted despite growing population and demand.<sup>3</sup>

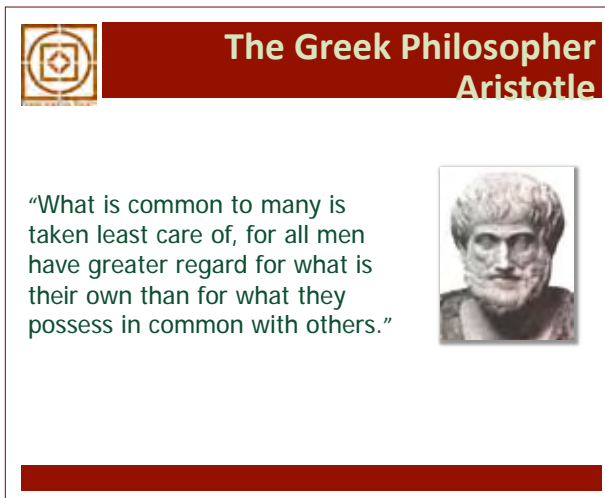
The notion that environmental problems exist because people are 'too greedy' or too selfish doesn't answer the question. People acting in their self-interest

does not always lead to social problems. In fact, in many cases, it leads to social good. This was Adam Smith's insight, that people pursuing their self-interest are often led, 'as if by an invisible hand,' to promote the social interest without that social interest being any part of their intention.

For some reason, however, in the areas depicted in the slides, Adam Smith's invisible hand doesn't achieve socially beneficial outcomes. There's something different about environmental problems; everyone pursuing their self-interest, instead of leading to a social good, is leading to a social bad. What is the difference?

### **THE TRAGEDY OF THE COLLECTIVE**

Aristotle actually identified the source of the problem long before we knew about these specific environmental problems.



The slide has a dark red header with a gold-bordered logo on the left and the title "The Greek Philosopher Aristotle" in white text. Below the header, on the left, is a quote in green text: "What is common to many is taken least care of, for all men have greater regard for what is their own than for what they possess in common with others." To the right of the quote is a small image of a classical marble bust of Aristotle. At the bottom of the slide is a solid dark red bar.

Can you see how Aristotle's claim gives us an answer to our question?

In all of the examples above, the resources involved are collectively owned. A widely used phrase is the 'tragedy of the commons.' I don't use the word 'commons' because the problem is not that they are owned in common, *per se*, as you will see shortly. I use the word 'collective' instead because I think it captures the essence of the problem better.

The standard phrase comes from a famous paper by Garret Hardin: *The Tragedy of the Commons*.<sup>4</sup> The basic story he tells is of a common grazing pasture outside the village where villagers send their cattle to graze. The problem is that the villagers have too many cattle on the commons for too long. The grass is eaten up before the monsoon, so there's not enough left for the cattle to graze, and some start to die off.



## Tragedy of the Commons

Overgrazing in the Common Village Pasture...

# WHY?




“The inherent logic of the commons remorselessly generates tragedy” —Garrett Hardin.

Why does this happen? People do not intend to overgraze. The irony is that each person acting in his own self-interest contributes to an outcome that hurts himself as well as others. To understand why, we must look at the incentives faced by each individual—we have to look from the cattle owner's point of view.

Let's say, for the sake of argument, that four hours of grazing per day is enough to allow my cattle to survive and grow. If I stop my cattle from grazing after those four hours, they will be okay. If I were alone, it would make sense for me to take my cattle off the commons after this time to preserve the grass. If the commons is collectively owned, however, I'm not sure that other people will keep their cattle grazing for only four hours. If I take my cattle off each day, and others do not, all the grass will be eaten up before the next monsoon. My cattle will be the weakest and die first while the cattle of those who keep them on the field will be stronger and live longer.

Therefore, I leave my own cattle on the field longer to try to get the grass before others do. Everyone thinks the same way and so all of them leave their cattle on the field to graze for too long.



## Tragedy of the Collective

Incentive Structure of the Individual:

- NO INCENTIVE to take into account, effects on others (externalities).
- NO POWER to constrain the behaviour of others (free riders).


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In this situation, there is no incentive to curb over-grazing because other people will use up what one conserves. As a result, the resource is used up faster and faster.

Similar logic can be seen in a fable about a king and queen in Gujarat. The queen wanted to bathe in milk. In response, the king issued a decree ordering everyone in the surrounding area to bring one glass of milk after supper to pour into the royal swimming pool. The next morning, the king and queen came down to the pool, but instead of finding milk, they found that the pool was full of water. Why? Each person reasoned that if others brought a glass of milk, there would be no way to tell that he put in a glass of water instead. Everyone reasoned the same way and brought water. So the pool was full of water, not milk.

In these cases, people acting in their own interests results in consequences that no one wants. The source of this problem is that the resource at issue is collectively owned. There is no effective system of mutual accountability to harmonise the incentives of the individuals involved.






## The Argument

All environmental problems are the result of the Tragedy of the Collective.

In each problem, a resource is involved that is collectively (publicly) owned.

### Ownership: Private, Community, and Collective

Clear ownership, that is, the right and ability to regulate access to a scarce resource, solves the tragedy of the collective. Hardin's tragedy of the commons is a problem of 'open-access resources' that no one owns and everyone may use without limit. If each cattle owner can be assured that others' access to the commons will be restricted in some rational way, he will have no incentive to overgraze.



## Structure of Property Rights

Resource	Collective	Community	Private
Land		→	→
Forests	←	→	
Water	←	→	
Fisheries	←	→	

Actual Change → Desired Change →

There are three different types of property rights structures:

1. Private
2. Community
3. Collective

Most of the property around us, land, buildings, tools, are privately owned by individuals, families, and organisations (either for-profit or non-profit, partnerships or publically traded).

Community ownership implies that a specific group of people owns and manages a resource together.

Collective ownership means anybody and everybody owns it ‘collectively.’ In other words, no individual or specific group owns it to the exclusion of others. For example, all of us own the forests, rivers, and lakes. There is no specific community that owns them. ‘All of us’ do. In practice, this means the state owns and manages the resource in the name of some collective (be it a region, nation, or the whole world).

What is the difference between community and collective ownership? A community is a limited, well-defined group of people that can be aware that they own a resource and that can take on the responsibility of managing it themselves. A large, undefined number of people, like all the people living in India, for instance, is a diffuse set of people: a collective. There is no strong relationship between such individuals or between them and the resources that they are supposed to manage together. Compared to mere ‘collectives’ of separate individuals, individuals in communities engage in many repeated interactions with each other and have a greater ability to communicate and organise with one another. Thus, they are better able to come up with and enforce strategies, rules, and norms for managing commons that overcome the tragedy of the collective problem.<sup>5</sup>

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A large, undefined number of people, like all the people living in India, for instance, is a diffuse set of people: a collective.

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Take land, for example. It used to be that all land was collectively owned. Over time communities divided the land and established ownership over

village areas and surrounding forests. Ownership of land slowly moved from collective to community ownership. Over time the land was further divided so that much of it is now privately owned.

What is happening in other areas? Forests, for example, before the British, were community owned. In India's history, as with many parts of the world, forests were managed by communities that lived in and around them. The British, however, took forests away from communities and nationalised them. They wanted forests to build ships and naval resources, which were a major source of power for the British government. When India became independent, the Indian government continued the practice. They took control over these resources and did not return them to local communities.

The case of water is similar. There are places around the world where water remains locally owned and managed. In California, for example, many farmers have stopped farming because they make more money by selling their water rights to nearby cities than they could make by using the water to farm. Cities are growing and have more demand for water, which they purchase from those who own the rights. There were big riots in Rajasthan, on the other hand, when the city government of Jaipur took away the water rights of nearby farmers on behalf of the city. The California example shows that this is not necessary. Where property rights are well defined, farmers have rights to water and can sell those rights to others who want to buy them. Owners can transfer water to those who have the greatest demand for it.<sup>6</sup>

Even today in India, Chilka Lake is community managed. People living around the lake have power to decide who has access to the lake and who can fish in it. The community has control, which is one of the rare examples in the country.

Another example is the creation of check dams in Rajasthan. There have been campaigns to develop small dams there to manage water so that it can seep back into the ground. In a few cases, they were actually able to revive whole rivers that had gone dry. Rajendra Singh, a community leader and water conservationist, began to parcel out water rights to families and individuals who had worked on the dams that created the water.

The government was so unhappy that he was giving away water that belonged to 'everyone,' he was put in jail.<sup>7</sup> Think about the incentives involved.

If water exists, it belongs to 'us,' collectively. If you bring it into existence, even with significant effort, you get no significant benefit because 'we,' the government, will take it away. What's going to happen to the supply of water?

So, to sum up, over the last 150 years or so we have moved away from individual and community management of resources toward collective control of resources.

If behind every environmental problem is a resource that is collectively owned, what is the solution to the problem? What I would like to suggest is that we go back at least to the level of progress we had achieved in earlier times, that is, community ownership, and where possible, even further to private ownership.



 **Solutions for the Tragedy of the Collective**

- 1. Communitise or privatise the resource**  
(change the ownership)
- 2. Price the use of the resource**

Property Rights Approach  
Terracotta Approach

Communitising or privatising scarce, open-access resources will allow specified groups to manage them more successfully. When the nature of a resource precludes specified ownership, however, pricing it will encourage people to economise on its use, find substitutes, conserve it and leave more for other people. Air, for example, is a kind of good that cannot be given easily to local communities or to individuals. Governments can, however, charge people to 'use' the air.

For instance, in the United States, the government wanted to reduce the level of sulphur dioxide (SO<sub>2</sub>) emissions, which cause acid rain. The government required the overall amount of SO<sub>2</sub> emissions be cut by 50%.

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Instead of specifying how each company was going to act to achieve this target, it allowed companies to decide amongst themselves what the most efficient way to do it would be. Companies that could reduce their pollution levels below the requirements had a right to sell these allowances in the form of tradable permits to companies that could only reduce emissions at a high cost to their business. This cap-and-trade approach allowed competition among companies to discover innovative, low cost ways to reduce pollution that took the specific differences among companies into account. A system of tradable emission credits limits how much people put in the air collectively and creates incentives for them to reduce their individual contribution in order to sell parts of their emission rights to others.<sup>8</sup>

### **GROUP ACTIVITY**

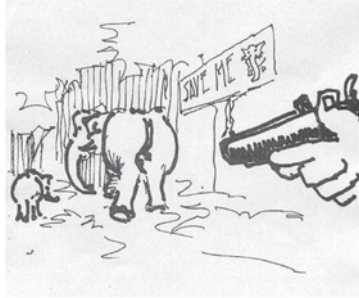
What I'd like to do now is give you a group work assignment (refer to next page). For the sake of the assignment, take it as a premise that every environmental problem is the result of the fact that the resource involved is collectively owned. Taking one of the examples we began with,

1. Identify the collectively owned resource.
2. Explain how the resource can best be transferred into private or community ownership. (Be ready to explain why you chose to devolve it to the individual or to a community level.)
3. If the resource cannot be privatised or communitised, explain how the resource can best be priced.

Instead of coming up with your own plan about how everyone should act and how you will 'incentivise' them with a set of centrally administered rewards and punishments, **explain how you can communitise, privatise, or price the resource and why you expect this arrangement will naturally lead people to make socially beneficial choices.**



### Spot the Collective Resource!



### Spot the Collective Resource!



**ACTIVITY 1:**

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## CASE STUDIES

There are three striking examples that illustrate the benefits of the property rights and pricing approach.

### 1) CAMPFIRE: Saving Endangered Species in Zimbabwe




The current approach to protecting endangered species is embodied in an international treaty called CITES (Convention on International Trade in Endangered Species).<sup>9</sup> The goal of the treaty is to ban trade involving endangered species or their body parts and to punish those who disobey these regulations. The logic is that trade restrictions will make killing endangered species less lucrative and reduce the incentive to do so. However, since the illegal trade in products involving endangered species is such a lucrative business, protecting species from poachers requires hiring more guards and equipping them with more powerful guns and jeeps in an attempt to outdo poachers. India's Tiger Task Force, as well as organisations like Greenpeace, WWF and the UN, all support this “guns and guards” approach.

Globally, despite the laws intended to protect endangered species, populations of endangered species are falling. One country, however, did exactly the opposite of the conventional wisdom: it legalised the ownership and even the hunting of elephants. This is the only country in the world where it is legal to hunt elephants, and yet it is the only country in the world where the elephant population is increasing. That country is Zimbabwe.



Everywhere it is illegal to kill elephants, the populations are falling. However, in the one place where it is legal to kill them, the population is growing. The key to understanding why is in the fact that the elephants were given to local communities as a resource through a policy called the CAMPFIRE Project (Communal Areas Management Program for Indigenous Resources).<sup>10</sup>



## CAMPFIRE, Zimbabwe


The Community Areas Management Programme for Indigenous Resources (CAMPFIRE) is a Community Based Natural Resources Management (CBNRM) programme that involves rural communities in conservation and development by returning to them the stewardship of their natural resources, harmonising the needs of rural people with those of ecosystems.

Since it started in 1989, more than a quarter of a million rural Zimbabweans have benefited.

**CAMPFIRE's approach is to make **wildlife** more valuable **alive** than dead.**

[www.campfirezimbabwe.org](http://www.campfirezimbabwe.org)


Think about how ownership changed the incentives. Before, when elephants were collectively owned, many tribal or farming communities would have experienced elephants as a nuisance that endangered their crops and animals. When poachers came along, tribals gladly looked the other way or maybe even helped them find the elephants for a small price. After CAMPFIRE gave local communities ownership, nature tourism and high price trophy hunting meant that elephants became an asset to the community. Now local communities actually protect elephants from poachers (unless they are able to meet the market price of \$12,000 for hunting license, of course, in which case they turn from poachers into legitimate hunters). Moreover, the communities have reason to manage the elephant population so that it does not decline. If the demand for elephant hunting increases, they can increase the price of the license. They mark older or sick elephants to be hunted but leave younger, healthier ones free to roam and multiply. As a result, the population is increasing. This should not be surprising when we consider, for example, that chickens and goats, which are regularly killed for food, are in no danger of extinction because they are privately owned. Their owners have an incentive to breed them and price their use to maintain and even increase their income.



## CAMPFIRE Revenues

- Nature tourism**
- Harvesting natural products**
- Trophy hunting:**

With a trophy fee of up to US \$12,000 or more, together with a daily hunting fee of \$1,000, one elephant can realise \$33,000 over the course of an average 21-day hunt.
- Meat cropping**

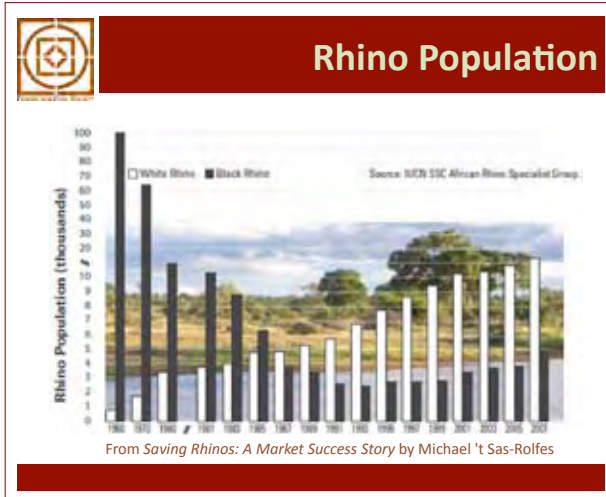


[www.campfirezimbabwe.org](http://www.campfirezimbabwe.org)

A similar policy was tried with the White Rhino in South Africa with analogous results.<sup>11</sup> Seventy years ago there were only 840 White Rhinos in South Africa which had been painstakingly increased from a mere 20 in 1900. By 2010, however, the numbers had climbed to more than 20,000. In 1982, the government sold rhinos at 1,000 Rand in the hope that private land owners would be good stewards of them. But the market price for a trophy hunt (which was legalised in the late '60s) was 6,000 Rand. Under these conditions, the landowners had a strong incentive to sell the rhinos immediately for a trophy hunt rather than pay to protect and breed them. The quantity of rhinos demanded continually outstripped the quantity supplied until 1985 when a private holder of white rhinos, and then the Natal Parks Board, began auctioning rhinos to allow their price to rise in response to demand. In 1991 the South African Law Commission past the Theft of Game Act of 1991, which permitted private ownership of wild animals that could be identified with a brand or ear tag.

Through privatisation and freedom of trade, the White Rhino went from being almost extinct to being the dominant rhino species today.

These two moves changed the incentives completely. It now made sense for private owners to protect and breed the rhinos rather than sell them right away.



The White Rhino went from being extremely endangered in 1980 to being the dominant rhino species today. The introduction of private property and trade in White Rhinos was so successful that South Africa and Namibia have started a similar approach to protecting their Black Rhinos with similar results.<sup>12</sup>

## 2) Individual Tradable Quotas: Preserving the Future of Fisheries in Iceland



### Overfishing: A Classic Tragedy of the Collective

Despite detailed regulations, overfishing threatens to collapse fisheries across the globe.




The problem of overfishing is very similar to Hardin's story about the common grazing pasture. In most places in the world, people are overfishing and threatening the survival of fisheries. The current approach to dealing with the problem is for governments to limit fishing technology as well as the time and duration of fishing seasons. Over and over again, fishers have compensated for these limitations in other ways: when regulators limit the length of boats, fishers use wider ones; when they shorten the fishing season, fishers figure out how to catch more fish in a shorter amount of time like using bigger nets, onboard freezers, and working longer hours. Regulators almost never address the basic problem of collective ownership.<sup>13</sup>

I hope you are now starting to see that, like other environmental problems, the threats to fisheries exists because they are collectively owned. One small country whose economy is largely dependent on fishing, Iceland, had to come up with a solution to this problem. But how do you privatise fish?

Iceland developed a system called ITQs (Individual Transferable Quotas).<sup>14</sup>

ITQ's were legally assigned according to historical catch. The government conducted a survey of all the fishing households in the country to see how much they had caught in the three years prior to the survey. It averaged these figures and gave each household a legal right to continue to catch the same

portion of the 'total annual allowable catch.' This is conceptually similar to historical homesteading in land. People originally cultivated land and put a fence around it. Later, governments recognised their property right in that land. Similarly, the government gave a legal title to each household based on the amount it had historically been able to catch. In this context, families developed cooperatives, analogous to resident welfare associations, to manage and enforce their respective rights.



Iceland

**Individual Transferable Quotas (ITQs)**


Fishing families are assigned a legally entitled fixed quota of fish according to historical catch.

**Total Amount of Fish Caught: 2000 tons**

Fisherman 1: 500

Fisherman 2: 1000

Fisherman 3: 500



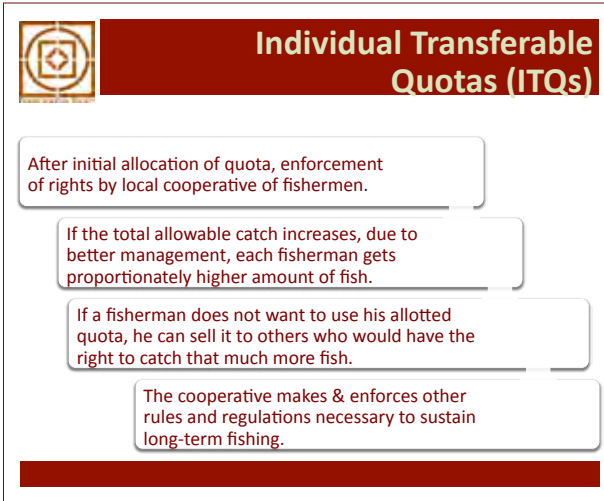
Quota defined in terms of proportion of total allowable catch, not in fixed quantity.

What affect did this have on fisheries? The principal problem of overfishing is that fishers catch too many small (juvenile) fish that need to grow and reproduce to replenish the resource. Each fisher should refrain from catching these small fish to preserve his future livelihood, but he is not sure that others will do the same, so he keeps them. Everyone thinks the same way and so the fisheries become depleted.

Now, take a fisher from Kerala and put him in Iceland. How does the new ITQ system change the incentives he faces? First ask yourself, would he deposit the small fish back into the water? Under the ITQ system, he is free to catch small or big fish. Which would he prefer to keep? Since big fish command a higher price, he would prefer to fill his limited quota with big fish to maximise his income. Each fisher would have an incentive to catch big fish only and to put back the small ones. The change in resource ownership under ITQs changes the incentives. The Kerala fisher would throw small fish back without anyone commanding him.

Also, owners of the quotas have an incentive to monitor and enforce their property right themselves just as landowners monitor the borders of their

property to be sure that their neighbours do not encroach on their property. So there is an incentive for many local players with local knowledge to enforce the policy without command and control from the top. Finally, ITQ holders have an incentive to cooperate in finding ways to increase the total allowable catch, such as creating artificial coral reefs.



The introduction of ITQs had two other interesting effects. The first was that after they were implemented, many more music bands emerged in Iceland. Why? Historically, Icelandic families had to keep at least one member of the family in the fishing business to maintain their customary right to fish in that area. Once they were given titles to those rights, people could actually buy and sell them. Many individuals exercised the “T” in ITQs, by selling them for money and pursuing other careers.

The second interesting thing that happened was that Greenpeace and other environmental groups recognised they could use this system as an effective way to protect fish: they could buy ITQs and refrain from exercising the right to catch. By buying 25% of the allowable catch, for example, they guarantee that 25% of the fish remain in the water. If they could raise enough money from enough environmentalists, they could potentially buy all the ITQs and stop all fishing in that area. (Of course the price of fish, and therefore of ITQs, would rise as the supply is reduced. Greenpeace would have to be able to outbid those who want fish on their plates.)

Theoretically, the same idea could be applied to protect the elephants in Zimbabwe, rhinos in South Africa and Namibia, and any other species that can be owned and traded.



## Natural Conservancy

- ❑ Total acres protected in the United States: 15,000,000
- ❑ Acres protected outside the United States Canada, Latin America, the Caribbean, Asia and the Pacific: 80,181,446
- ❑ Current number of Conservancy preserves: 1,400
- ❑ Conservancy members in 1952: 554, in 2001: ~ 1 million

How can you protect species that have little or no market value in a traditional sense? Take the case of Nature Conservancy, which is a private association of concerned individuals that owns 1,400 conservancy preserves protecting 15 million acres in the United States and 80.2 million acres across Canada, Latin America, the Caribbean, Asia and the Pacific. They manage the largest system of private nature sanctuaries in the world.<sup>15</sup> Nature conservancies like this use the property rights approach to protect even those species that have little or no market value in the traditional sense.

### 3) Road Pricing: Ending Road Congestion in Hong Kong



## Traffic Congestion



Have public appeals to “Go Green” solved this?

Traffic congestion is an overuse of road capacity. Once again, the overuse of roads is caused by the fact that they are collectively owned, open-access resources. What is the current approach to road congestion? Usually, governments make public messages trying to persuade people to use their car less and use public transportation more. We know from experience how effective these are. In addition, they try to continually increase road-space by widening roads and building flyovers. While this may decrease congestion for a short while, over time people increase their road use until the congestion emerges again.

**If the problem is that roads are collectively owned. How do we privatise roads?**

There are already many toll roads where people pay directly for their use. What is the consequence of pricing road use? Prices cause consumers to conserve on their use, find substitutes, and reserve 'marginal' amounts of a good for other people to use. Instead of driving everywhere in their own car, people walk more, carpool more, use more public transportation, forgo some non-essential trips, and so on. Some buy bicycles and use them more. Moreover, higher rates during peak hours encourage some to take their trip earlier or later in the day and thus to leave road-space for people who want to drive more urgently during peak hours. Governments spend lots of money on public messages trying to persuade people to do these things, but when the resource is rationally priced, people choose to do these things automatically.

Some mistakenly believe that pricing roads would impose net increases in costs. But this is not obvious. They don't realise that costs of congestion in terms of time and uncertainty are already very high. We not only have to pay in terms of time we use waiting in traffic ourselves, (how much time have you spent waiting in traffic?), we also have to pay higher prices for goods we buy that are transported by road because we have to pay for the wages, petrol used, and waste caused by congestion. By reducing congestion, we replace the cost of time in terms of waiting, delivery, and uncertainty for more predictable monetary costs. In fact, more predictable availability of road-space and monetary pricing enable people to calculate, plan, and reduce their costs over time.

Finally, road-pricing gives owners and potential suppliers the incentive and resources to supply more and better services, rules, and road-space over time.

Hong Kong instituted a road pricing in the 1980's by placing sensors on each car and under the road that recorded how far cars travelled on the road and when. At the end of the month, people received a road bill just as they receive telephone and electricity bills.<sup>16</sup>





## FROM A GREEN TO TERRACOTTA APPROACH

The approach I have illustrated is often referred to as the property rights approach to environmental problems. This is opposed to a command-and-control approach, or what I prefer to call the “guns-and-guards” approach. Given collective, or government, ownership does not align the self-interest of various local stakeholders with the conservation of a resource, governments have to issue commands on how everyone will behave and often enforce these commands using guns and guards. As seen above, however, the property rights approach can align the self-interest of local individuals and communities with preservation of the resource, removing the need to issue central commands and reducing the need for guns and guards.

Terracotta captures our idea that people’s use of natural resources does not destroy or deplete them if the ownership and incentives are properly aligned.

**From the Green to Terracotta Approach**

Green Approach	Terracotta Approach
	
<ul style="list-style-type: none"><li>• Command &amp; Control</li><li>• Guns &amp; Guards</li></ul>	<ul style="list-style-type: none"><li>• Property Rights</li><li>• Individual Cooperation</li></ul>

We also call this approach the ‘Terracotta’ approach to distinguish it from the ‘Green’ approach. Green implies a vision of untouched wilderness irrespective of human needs. Terracotta literally means “baked earth;” it implies a human use of the resource without destroying it. Terracotta captures our idea that people’s use of natural resources does not destroy or deplete them if the ownership and incentives are properly aligned.

## CONCLUSION



### Correct the Incentives

Save the Environment!

- 1. Communitise or Privatisise the resources**
- 2. Price the use of the resource**




The first response people commonly give for environmental problems is that we are too many and or too greedy. The solution to this problem would be to reduce our number or change our nature—a very tall order. But we saw in each of the three examples above that property structures (either private or community) and prices can solve environmental problems without having to change human nature. In each case, policy makers didn't try to change the way people are, they tried to find solutions that used the way people are in order to enable them to solve the problems.

Underlying each environmental problem, there is a collectively owned resource. It is collective ownership that gives rise to the problem. We need to remember to identify the collectively owned resource at stake and then research and think hard about what would be the best way to privatise, communitise, or price it in order to empower people to solve environmental problems themselves.<sup>17</sup>



## End Notes

- <sup>1</sup> My answers: Slide 1: [Overfishing](#), Slide 2: [Poaching/Endangered Species](#), Slide 3: [Overuse and pollution of water](#). Regarding the use of water, some have claimed that India is going to face a serious water shortage and that the next world war will be over water usage! <http://www.hindu.com/fline/fl1609/16090890.htm>
- <sup>2</sup> Most of our aspirations, though not necessarily 'materialistic,' rely at least in part on material conditions.
- <sup>3</sup> Examples of growing supplies and shrinking cost of resources can be found in the work of Julian Simon such as *The Ultimate Resource 2* [http://www.juliansimon.com/writings/Ultimate\\_Resource/](http://www.juliansimon.com/writings/Ultimate_Resource/)
- <sup>4</sup> Garrett Hardin *The Tragedy of the Commons*, Science Magazine, 13 December 1968: Vol. 162 no. 3859 pp. 1243-1248: <http://www.sciencemag.org/content/162/3859/1243.full>
- <sup>5</sup> For an explanation of what conditions tend to lead to more sound community management of common-pool resources, see Elinor Ostrom's *Self-Governance and Forest Resources* Occasional Paper No. 20 ISSN 0854-9818 Feb. 1999 [http://www.cifor.org/publications/pdf\\_files/OccPapers/OP-20.pdf](http://www.cifor.org/publications/pdf_files/OccPapers/OP-20.pdf)
- <sup>6</sup> See the Environmental Defence Fund on water trading in California, <http://www.edf.org/ecosystems/valuing-water-its-true-worth>
- <sup>7</sup> Personal communication with Rajendra Singh. See also <http://www.rediff.com/news/2001/aug/15inter.htm>
- <sup>8</sup> See the Environmental Defense Fund website, <http://www.edf.org/approach/markets/acid-rain>
- <sup>9</sup> Visit the CITES website, <http://www.cites.org/eng/disc/what.php>
- <sup>10</sup> See <http://campfirezimbabwe.org/>.
- <sup>11</sup> See The Property and Environment Research Center Case Study, *Saving Rhinos: A Market Success Story* by Michael 't Sas-Rolfes <http://www.perc.org/files/Saving%20African%20Rhinos%20final.pdf>
- <sup>12</sup> Some worry that such treatment of animals may fail to respect their moral worth (for instance Michael Sandel in his book *What Money Can't Buy: The Moral Limits of Markets*). As a vegetarian, I empathise with this concern. My first response is that command-and-control approaches to solving this problem have been ineffective and costly and are likely to continue to be ineffective and costly. To me, preserving the species is preferable to its extinction. Secondly, property rights do not imply "commercial use." In the CAMPFIRE program, more emphasis is placed on nature tourism to raise revenue than on hunting. Also, the Nature Conservancy shows that people can pay to protect species under property rights arrangements.
- <sup>13</sup> An excellent publication that offers a broad overview of the benefits of a property rights approach to fishing policy and the problems with government regulation of fisheries is *Fishing For Solutions* by Michael de Alessi published by the Institute of Economic Affairs <http://www.iea.org.uk/publications/research/fishing-for-solutions>.
- <sup>14</sup> *Overfishing: The Icelandic Solution* by Hannes H. Gissurarson also published by the Institute for Economic Affairs <http://www.iea.org.uk/sites/default/files/publications/files/upldbook16pdf.pdf>.
- <sup>15</sup> <http://www.nature.org/>
- <sup>16</sup> Although the Electronic Road Pricing (ERP) pilot outperformed the parameters specified for success, the scheme was not extended for a confluence of reasons that made it unpopular at the time. (One of which was the concern that the Chinese government, which was to take over in 1997, would use the ERP as a means of big brother-type surveillance.) See *Timothy D. Hau (1990), "Electronic Road Pricing: Developments in Hong Kong 1983-89"* [http://www.econ.hku.hk/~timhau/electronic\\_road\\_pricing.pdf](http://www.econ.hku.hk/~timhau/electronic_road_pricing.pdf)
- Many cities are now using area-based, prepaid use-taxes. These are rather crude compared to electronic pricing. A notable exception is Singapore, which imitating Hong Kong, replaced its pre-existing Area Licensing Scheme (started in 1975) with Electronic Road Pricing in the 1990's. It now uses an electronic tolling system to price road use and is experimenting with a GPS road pricing system. However, in addition to road pricing, Singapore uses multiple other taxes and requirements to make car ownership more costly. This would be unnecessary if road prices reflected actual supply and demand conditions.
- <sup>17</sup> For more information and training in the property rights approach to environmental problems, see The Property and Environment Research Center (PERC) <http://www.perc.org>. For more information on about local community governance of common-pool resources see The Vincent and Elinor Ostrom Workshop in Political Theory and Policy Analysis <http://www.indiana.edu/~workshop/>.

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