RETHINKING ENVIRONMENTAL CONTROLS

Management Strategies for Common Resources

Carol M. Rose

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How can we make sense of environmental law? Our legislators churn out great undigestible masses of statutes about the environment, which are in turn interpreted by mounds of regulations, all densely packed with bizarre terms and opaque acronyms.[1] One way to simplify this forbidding regulatory mass is to envision our environmental controls as exemplars of a few generic strategies for managing resources, and then to compare and critically analyse those strategies.

The first question in such an enterprise is this: What dominating characteristics make resources "enviromental," so that they need some distinctive management? The conventional view is that environmental resources present variants on "commons" problems, and in the the first two sections of this paper I will explore that view. In the third section, I will set out models of four generic strategies that may be used to manage "commons" resources.

In the fourth section, I will focus on the cost components of management, in order to approach the all-important question about which is the "best" or least-cost strategy, in the fifth section I take up that question. The section identifies an

evolutionary relationship among the four strategies, and argues that none of these strategies is an absolute "best" or least-cost; instead, and the choice of the best depends on the level of demand for or pressure on the particular environmental resource. At low levels of pressure, one strategy might be the least costly, whereas at higher levels, a different strategy is better.

In fact, of course, there is a great deal of controversy about which strategy is best, and this controvert indirectly raises some questions about one management strat y that tends to be underrated or marginalized in much of the modern environmental regulatory discussion. That strategy is norm-creation—what we might call moral suasion or exhortation. In the sixth section of the article, I will consider that strategy. It is especially important to do so because while moral and ethical issues are certainly under discussion in environmentalism, they tend to be set up on opposition to the supposedly more hardnosed management approaches.[2] I think this is a mistake, since different management techniques themselves may carry different normative messages, and those different messages in turn may help to create a culture that itself has some effect on the way people use environmental resources. My more general point is that if culture does have an effect on behavior, we ought to be paying attention to the culture that is created by our management strategies when we choose one management strategy over another.

1. THE ENVIRONMENT AS A COMMONS PROBLEM

In everyday parlance, the "environment" denotes the indefinite surroundings—the set of things or circumstances that are "just there" as a general ambience or a given. In this sense, for example, we may talk of an "intellectual environment" or a "business environment." In our current ordinary language, though, the unmodified "environment" generally refers to an amorphous set of physical surroundings, including the air and waters and wildlife. But insofar as an "environment" is just a given, we think the word denotes something that in large measure is simply out of our control.

Economists come at this subject from a different angle, but their account reveals something about the reasons why we might feel that that the "environment" is beyond our control. According to the economists, the evironment belongs to the realm of things that don't belong to anybody in particular.[3] And, they go on, because environmental goods don't belong to anybody in particular, people tend to treat these goods as if they belonged to everyone, and individuals feel free to use and dispose of these goods however they choose. The result, on this account, is that environmental goods tend to be exahusted, wasted, and seldom if ever replenished by their users.[4]

The classic example is fishing areas, where anyone who wants to fish can go and catch fish.[5] In such an area, the fishers may find to their distress that the fish become depleted due to overfishing. Why does everyone overfish, even to the detriment of the body of water and its living stocks? On the economic

account, they do so because each knows that, even if any particular individual refrains from fishing so intensely, everyone else else will continue to fish, and in fact might just a little bit more, to take up the slack left by any moderate fisher.[6] The moderate fisher, in short, would just be a sucker; she would lose out while all her rivals would take what she gave up. For a similar reason, the fisherfolk do not restock the area: any individual restocker would find that the most of new fish would go to other fishers, who have just been sitting around doing nothing and who now can take a "free ride" on the restocker's investment and work. For anyone aside from the most stubborn conservationist, that prospect lessens any individual's incentive to take the effort to restock.[7]

In short, whether the beneficial act is negative (moderating one's take) or positive (restocking the pond), the benefits go largely to others, who take a "free ride" on conservationist behavior.[8] In game theory language, the fishing hole and the environment generally represent an n-person prisoners' dilemma, in which one strongly suspects that one's opposite numbers will "defect," and in which one's own individual best option is thus to defect too—even though taken together as a group, everyone might be better off if everyone cooperated.[9] Thus no one (except suckers, altruists and fanatics) acts to conserve the fishing area, and so its predictable ultimate fate is depletion.

Now, as with other dilemmas of this sort, we can at least imagine that the participants might do something about it. They

could form a fishpond committee, for example, and could then police the individual fish harvest, and/or charge restocking fees to all the members. But if the numbers of fisherfolk are too large or heterogeneous, that option also becomes much less likely. For one thing, some of the fishers may shirk the organizing work; and for another, even if they do get organized, it is still difficult to make sure that everyone does his/her respective duties in conserving and restocking. Thus organizing and management efforts face the same kinds of obstacles that conservation or restocking efforts did: On the whole, nobody wants to be a sucker and do all the organizational work, and consequently, that work may well not get done at all.[10]

Getting organized to overcome the overfishing problem thus entails the same difficulties that the overfishing problem itself did in the first place. To be sure, organizing may be somewhat different from restocking the fish, insofar as we find that, in everyday life, there are some "political entrepreneurs" who do seem to enjoy volunteering for this sort of thing;[11] but the usual view of these entrepreneurs is that they have to get something special or they won't take the effort. Failing such entrepreneurs, organization often does not happen; and thus moderation and restocking don't happen either, and the fishing area gradually declines to a dead sea.

The fishing story of course is not confined to to fishing grounds. A similar story can be told about the littering of parks and roadsides, or about the "storage" of wastes in the air,

or about the dumping of all sorts of refuse in the oceans—or indeed about quite a lot of other human behavior. It is the classic story of unowned resources: they are likely to be overused and under-cared-for, and even interested or well-meaning parties are paralysed to do anything about it.

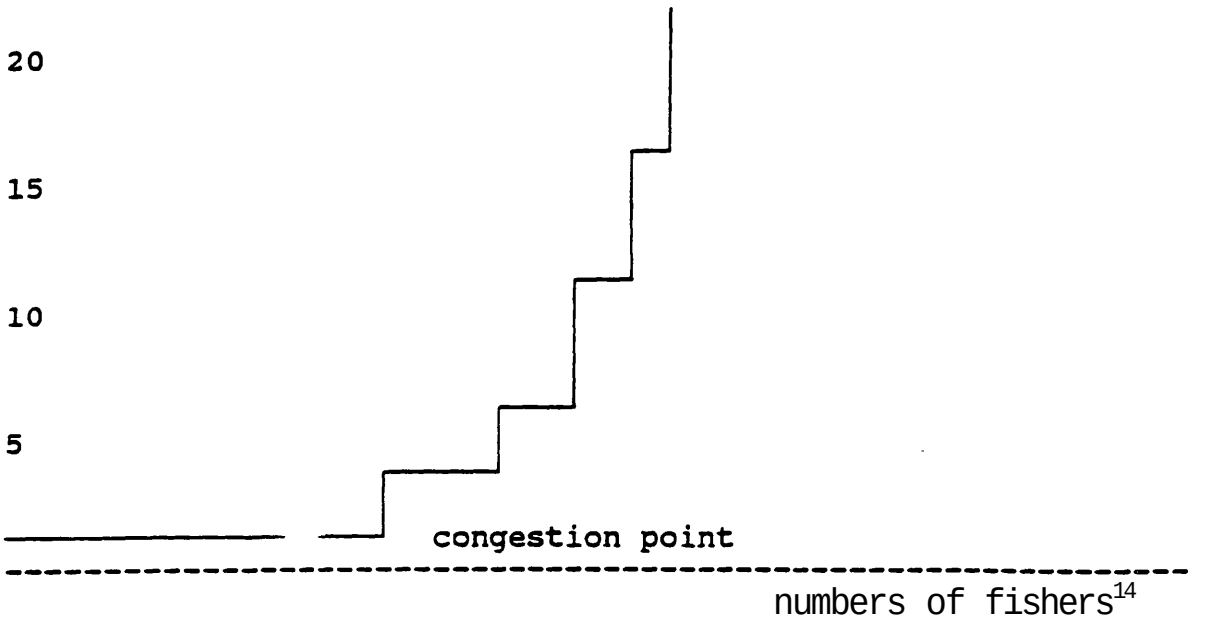
But sometimes, for some reason, we do get ourselves organized, whether through everyone's efforts or through the political entrepreneurs.[12] I will come back to this point later, but for the moment, let us look at the optimistic side: suppose we somehow do get group cooperation, or find an entrepreneur who can get us off the mark: what kinds of things would help, if we could indeed do something about our environmental problems?

2. THE TIMING QUESTION: COMMONS AND CONGESTION

To answer the question, "what would help?" we need to consider the question when we need help, and once again, fishing gives us a good example. A fishing area might be thought of as a type of resource that has been called "congestible."[73] To give some examples: an ice cream cone, at least under ordinary circumstances, is not a congestible resource; it is rather an individual resource, "congested" from the start. An ice cream cone normally only has one user, and that's it. if someone else tried to lick your ice cream cone, you would notice right away, and unless it were a close friend, you would probably object and try to protect the cone from the interloper. But with some other

resources, several people can be users in common, at least up to a point—a milkshake might allow two consumers, if they are friendly, while a swimming hole might allow, say, ten or fifteen. Beyond some point, however, these resources start to become scarce or "congested" with users. To take the fishing example, up to a point, a number of people can fish and no one really notices, because everyone can take all that s/he wants and the fish can still regenerate at a level that seems acceptable. But beyond some point of congestion, additional fishing hurts all the resource users, at least a little at first, and then ever increasingly.

Here is how the perceived resource depletion costs would look if charted:



Congestible resources like fishing areas are typically the subjects of environmental problems. Their common use seems unproblematic under conditions of low consumption, and because under those circumstances there seems to be plenty for everyone, no one tries to patrol additional fishing. But *at* some point, if increasing fishing makes the resource perceptibl career, and perhaps even threatens the resource with ruin, we collectively start to feel the pinch. But at that point we may be quite uncertain about what to do next, since we already have established habits and practices. Even if those practices cause the depletion that makes us uncomfortable, we may find them difficult to change.[15]

Besides, there are different points at which we might feel uncomfortable with further depletion. Even whooping cranes at their lowest ebb proved to be "renewable," but many people used

to feel (and some still feel) that the crane level was uncomfortably low. On the other hand, we might not want to restrain all our activities so as to allow whooping cranes to renew themselves at the highest conceivable level, because that might entail major sacrifices of other things we think we need even more. To take another example, air pollution: most people are willing to put up with some level of air pollution, because we think we need to do so for our transportation and electricity, among other things, which in themselves may be more important to our health and well-being than the next increment of clean air.[16] So on balance, we may be comfortable with something less than the most pristine air we could conceivably have—that is, we may be willing to put up with some "congestion" in air use.

Nevertheless, at some pollution level the balance may tip in favor of halting further depletion of clean air, and of allowing the resource to renew itself at a given level—a level that is compatible with what we perceive to be necessary for our health and aesthetic needs. I am not here directly addressing this balancing question, though I will come back to it. I would like to suppose that the balance has been struck at least for the time being, and that we know the level—call it MAXLEVEL—at which we want to hold resource use.[17] Once we have deciced about a resource's MAXLEVEL, our question becomes this: How can we change our ways, and restrain our use of the resource?

One possibility, of course, is to try to influence people so that they do not to want a given resource so much—for example,

we might rename the "Rainbow Trout" as the "Bug-snarfer."[18] But for the moment, I will concentrate not on directly reducing demand for resources, but rather on controlling efforts to use them, since that is what *a* good deal of our environmental legislation does.[19] What ways do we have, then, to restrain people from taking too much of a congested environmental resource?

3. FOUR STRATEGIES OF COMMONS MANAGEMENT

Some writers divide commons management strategies into "private" and "public," according to whether controls are imposed by insiders (private) or by outside authorities (public or governmental).[20] The identity of the controlling body as "private" or "governmental" may indeed be important for some issues—particularly those of "rent-seeking" and public choice problems that are thought to distort public bodies' decisions.[21] Nevertheless, private and governmental managers often use techniques that are structurally quite similar—as has indeed been shown in the classic case of the fisheries[22]—and it is equally important to consider the substance of those techniques or strategies, whether they are used by public or private managers.

One economist, Stephen Cheung, has made a very useful list of several possible management strategies.[23] Cheung listed his strategies more or less in ascending order of the difficulty and expense of their administration, to wit:

1) First, of course, even before we get to Cheung's strategies, we could do nothing—that is, we could leave our fishing ground an open-access commons. This no-control option, which I am rather boringly calling DO-NOTHING. is a kind of baseline over against which we can measure the effectiveness of other strategies.

2) Second, we could exclude newcomers, a strategy to which I will refer as KEEPOUT; once we get to a congestion point, where we feel the pinch of overcrowding and resource depletion, we keep out everybody else. Our "insider" fishers, on this model, would continue to fish any way they chose, but they would cut off the access of newcomers. This would mean, of course, that although the fish levels might be preserved, they would only be accessible to the insiders—outsiders wouldn't get any.

3) Third, we could regulate the way in which the resource is used or taken, effectively prescribing the methods by which users may take the resource; I will refer to this strategy as RIGHTWAY. In our fishing area, for example, we could limit fishing to fly-casting, and not allow trawling or the giant fishnets that have been in the news lately as destroyers of ocean wildlife. Under this RIGHTWAY scheme, fishing would be open to all who want to fish, but only if they fish in a certain way—a way, we hope, that limits the overall number of fish they are likely to catch.

4) Finally, we could manage the fish by giving individualized property rights to them, a strategy to which I

will refer as PROP. For example, a PROP regime could set a limit on the total allowable take of fish, and then auction off fishing rights to those who wanted to purchase such rights. In a sophisticated version, the fishers could trade these rights among themselves. Or alternatively, we could try to figure out a per-fish or per-pound price that would discourage fishing above an acceptable level, and then require each fisher to pay a bounty on each unit taken.

There are of course equivalents to all these strategies in our past, present and hypothetical environmental law. Take air pollution control: Strategy 1, DO-NOTHING is represented by the "anything goes" attitude to air pollution we used to find, especially in undeveloped areas. Strategy 2, KEEPOUT, corresponds to a kind of crude land use control, in which new facilities are halted; new shopping centers, for example, have sometimes been disallowed on the ground that they may increase air pollution from the auto traffic that they attract.[24]

The third strategy, RIGHTWAY, is very widely reflected in our law. The rather malleable prohibitions on "unreasonable use" in classic nuisance law effectively confine the manner of using air, disallowing practices that go beyond the customary and normal.[25] In much more complex fashion, the modern "command and control" environmental measures prescribe the ways air may be used in highly specific fashion, demanding that would-be polluters use the "best available technology," such as scrubbers in coal burning exhaust stacks, or catalytic converters on

automobiles.[26]

Finally, the fourth strategy of PROP, through which resource rights are turned into individual entitlements, is a technique that has been much discussed lately, both in academic literaute and in legislative proposals for purchaseable and tradeable pollution rights.[27] It now seems that Congress will incorporate this strategy into the controls on acid rain.[28]

Sometimes these various strategies are combined, notably KEEPOUT and RIGHTWAY. A typical customary pattern, for example among shellfishers or graziers, is that newcomers are excluded altogether, while the "insider" oldtimers only use the resource in a well-established customary manner.[29] A somewhat different combination of the KEEPOUT and RIGHTWAY strategies appears in some modern air pollution controls: only new polluters are normally required to install highly technical pollution control devices, while the established polluters may merrily foul the air as they have in the past.[30]

Cheung's article did not say how we should choose among these generic strategies, though he suggested that in principle a choice should be possible. The way to get to it is to consider costs.

4. MANAGEMENT COSTS AND RENT DISSIPATION

Chueng and others have made explicit one important insight about managing resources: resource management strategies all cost something.[31] Thus generally speaking, even if we can find

a level of resource use that we think most appropriate, we need to recognize that holding use to that level will not be done for free. We still need to to find the strategy that hold use at the appropriate level, at the lowest total cost.[32]

What, then, are the cost components of these various strategies? Any answer, of course, will grossly oversimplify, but one has to start somewhere, and so I propose the following three components:

1) Administrative or system costs. These comprise the system-wide costs of running a management strategy, including both organizational and policing costs.

2) User costs. These are the costs of extra equipment, such as scrubbers or catalytic converters, that individual resource-users must invest in to satisfy the requirements of any given management strategy. Since so many are technological, I will sometimes call them "technology costs."

3) Overuse or failure costs. This cost category accounts for breakdowns and slippages, and comprises the continuing "externalities" under a given strategy—the continuing conflicts and damage caused by resource depletion that escapes the control system. These costs reflect the point that no management strategy is perfect; because of management failure, we may still wind up somewhere beyond our acceptable MAXLEVEL—that is, beyond the point at which we feel it is healthy, safe, or comfortable to permit continuing resource depletion.

Now, when we choose one or another control strategy, the

combination of administrative costs, user-technology costs and overuse/failure costs will vary according to the what the literature of common resources often refers to as "pressure."[33] "Pressure" on a resource occurs when more people try more intensely to take the resource, for any reason at all—perhaps because tastes change to make the resource more valuable, or because new technology lowers the costs of exploitation.[34]

More technically speaking, it is often said that there are "rents" to be gained in natural resource exploitation, since these resources may yield revenues and pleasures above the cost of taking the resource.[35] At low levels of value, any rents may go more or less unnoticed; under those circumstances, there is little effort to exploit the resource, and the few users of the resource enjoy whatever little-known or idiosyncratic "rent" they derive without suffering congestion from other resource-users. In the fishing example, this is the stage in which only a few fanatical fishers bother to buy the equipment and brave the cold to catch the elusive trout.

But as more people value the resource—if, say, trout-eating or trout-fishing comes to be a fad; or perhaps as the resource becomes cheaper to exploit—if, say, new trout nets or boats are invented—the gap at least temporarily widens between the resource's value and the cost of exploiting it. When the resource's "rents" become larger, they also likely to become more noticeable, and consequently more people are likely to take greater efforts to get the resource.

The problem is that if more and more people want more and more fish, so much effort may be poured into their exploitation that the fishing resource itself is threatened with depletion, and the cost of fishing rises while the return declines. Thus unless the fishers are somehow restrained, their competition for the fish (or other renewable resources) dissipates the rents that might be had from exploiting the resource at a more appropriate level.[36] It is for this reason—to hold down resource exploitation and prevent rent dissipation—that we institute mangagement regimes on the resource.

Thus a higher rent level attracts the exploitation efforts that dissipate rents, or alternatively, that induces us to institute management systems to avoid rent dissipation.[37] The problem is that management systems dissipate rents too. Under any management strategy, there will be some "mix" of system costs, user costs and overuse/failure costs, and all these management costs dissipate rents, though hopefully not so much as unrestrained exploitation does.[38]

Once we have settled on a MAXLEVEL for resource use, then, our goal should be to choose the least-cost management strategy, the one with the lowest "mix" of rent dissipating factors. What follows is a series of graphics that illustrate the cost "mixes" of different management strategies under different levels of pressure on a resource. They represent the idea that larger rents themselves bring about higher management costs, since at higher demand or "pressure levels, more institutional effort is

required to restrain overuse. More technically, then, these graphs are depictions of the relationships between rents and rent dissipation;[39] in **each,** the horizontal line represents pressure on the resource (technically, rents from the resource),[40] while the vertical line represents the total costs of the given control strategy, (dissipation of rents under that strategy), due to its mix of system costs, user costs, and failure/overuse costs.[41]

5. COMPARING THE COSTS OF MANAGEMENT STRATEGIES: WHICH IS BEST?

Strategy 1: DONOTHING
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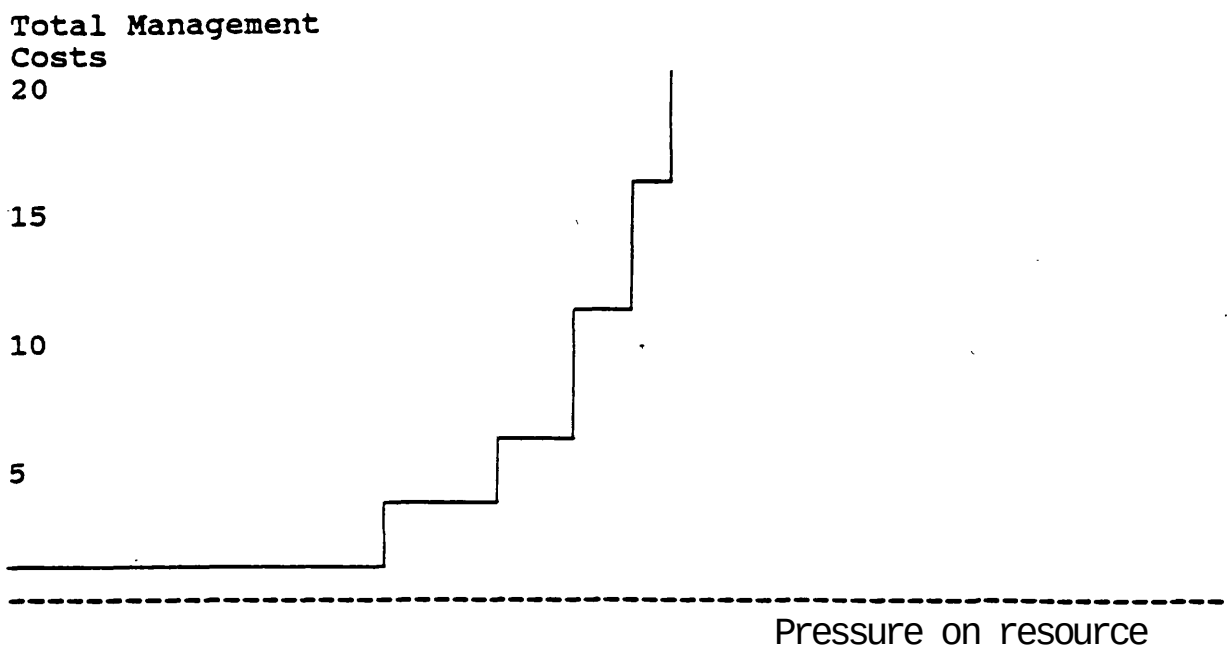


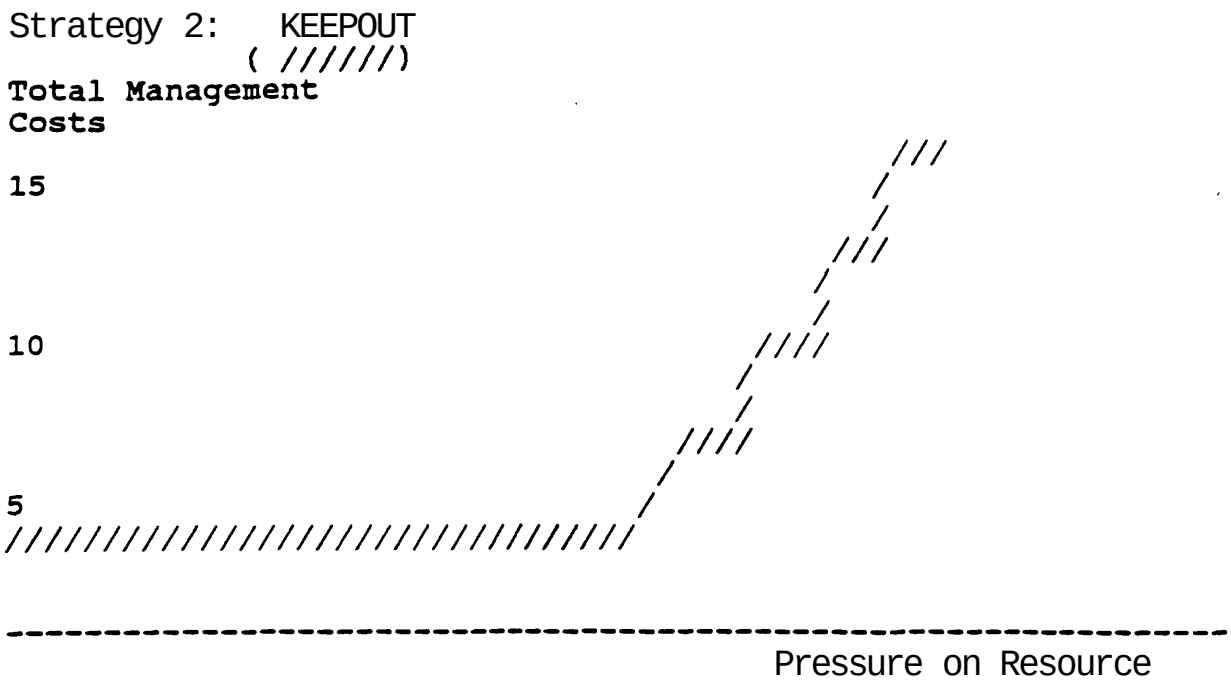
To begin with Control Strategy 1, DO-NOTHING: In essence, the costs of DO-NOTHING simply replicate the congestion cost curve. As people want a resource more, they work harder and harder to get it. In the absence of any constraints, their increased efforts translate directly into an increased total exploitation, at least until the resource is depleted.[42] But of course as the fish are depleted, individual fishers may wind up with less and less, as their increasing efforts cause increasing difficulty to one another. Thus their ever-more-strenuous efforts to gain the resource's "rents" dissipate those very rents.[43] The chief costs of the DO-NOTHING strategy, then, fall

into the category of overuse or failure costs. Of course, when the resource is depleted substantially, the discomfort, conflict and diminished return entailed by overuse may be substantial. It is because of these overuse costs that, as Gordon laconically observed, fishermen are not wealthy.[44]

But sometimes the DO-NOTHING strategy might be best. When demand for the underlying resource is slight, DO-NOTHING is especially cheap: there are no administrative costs for organization and policing; no user technology is specifically dedicated to control; and since no one is trying very hard to get the resource, overuse or depletion costs are still low, if they are felt at all.[45]

But once again, if values rise, and more and more people are willing to work harder and harder to get the resource, overuse costs rise—perhaps even dramatically—-and they may overwhelm any savings that can be made by dispensing with administrative and technical controls.[46]

The second strategy, KEEPOUT, abandons the open access of DO-NOTHING, and instead excludes outsiders or new uses:

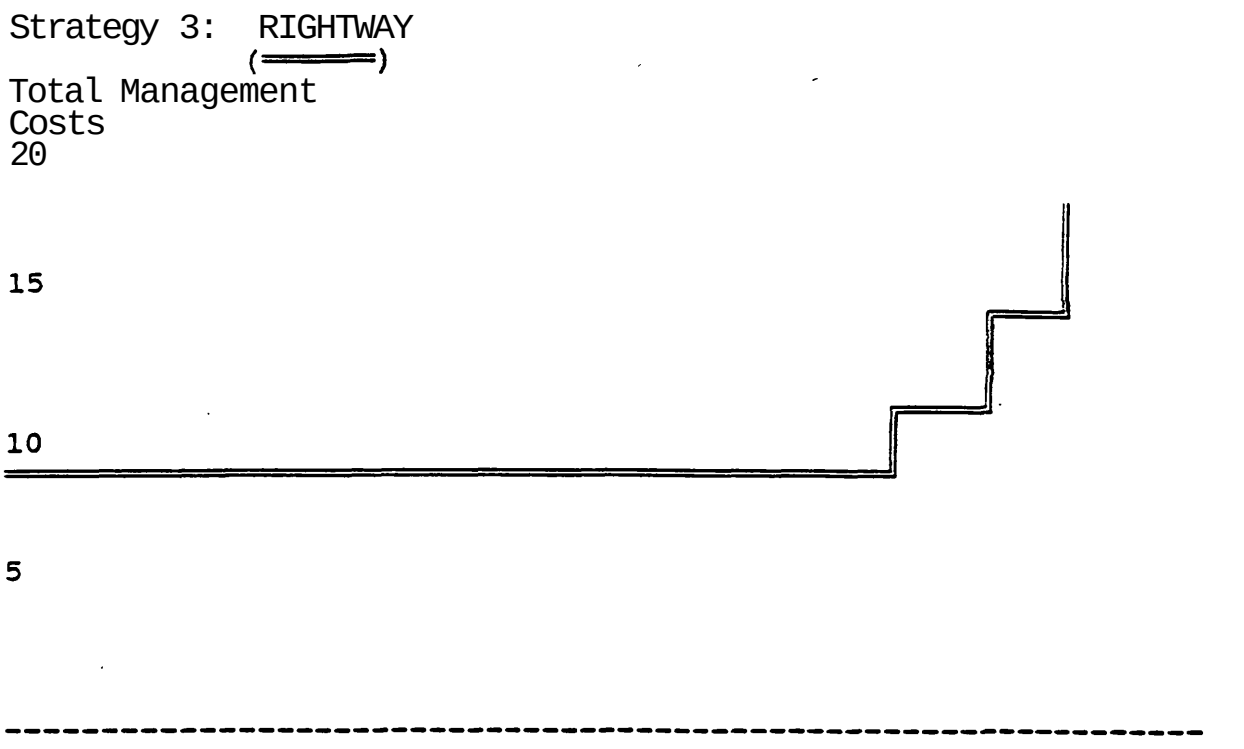


As the chart suggests, when we introduce KEEPOUT, administrative or system costs are obviously higher than DO-NOTHING; someone may have to do a good deal of organizational work to get the control system introduced, especially if many people see an advantage in the older system of open access. Then too, the system requires monitoring effort: the insiders may have to police the pond, or hire police to keep interlopers off, and they may need boats and weapons too. Besides, like any new system, this one may not work very well at the outset, so the failure/overuse costs may remain fairly high. Then too, there are morale costs, especially at the beginning: some may grumble that we really don't need all this control activity, since there are still plenty of fish, and keeping out new fisherfolk just looks stingy and ungenerous.

But if pressure on the fishery continues to rise, and more and more people try to get in to take the fish, the system may seem worth the effort (at least to the beneficiary insiders)—that is, its total costs may look lower than a "do-nothing" solution. Once in place, we don't have to do much more organizing work, or buy a whole new fleet of police boats. Besides, the system may work better with experience, and may really reduce total take from the fishery, no matter how hard outsiders try to break the system. Morale issues may improve too, once the homefolks are used to it; once they think the system is doing them some good they may be quite willing to enforce it.[47] The increasing outsider disgruntlement may offset this gain, however.

Indeed, supposing we copntinue to move further out on the horizontal line of pressure, outsider poachers and interlopers may overrun the KEEPOUT control system. Insiders may have to hire more and more cops and boats, perhaps with less and less effect; and so policing costs rise, while the failure costs of conflict and depletion do too.

One way to deal with this problem is to permit the outsiders to enter, but to control the means by which all fishers can take the resource—that is , to move to the third, RIGHTWAY strategy that controls the <u>way</u> the resource is used:



With this strategy, we move to something like nuisance law, or to some kindred control regime that specifies how people are allowed to use resources. One of the surreptitous attractions of RIGHTWAY, in fact, is that it may not be so far from KEEPOUT, since established resource users are apt already to have to prescribed boats or rods or whatever. But RIGHTWAY does have additional system costs that are likely to be higher than the costs of simply banning outsiders. Now we have to think about which fishing devices (like nets and traps) we need to outlaw, and which devices (like fly-fishing) will be permitted. Our everyday policing costs are going to be somewhat higher too, because our cops have to do more than just checking on something

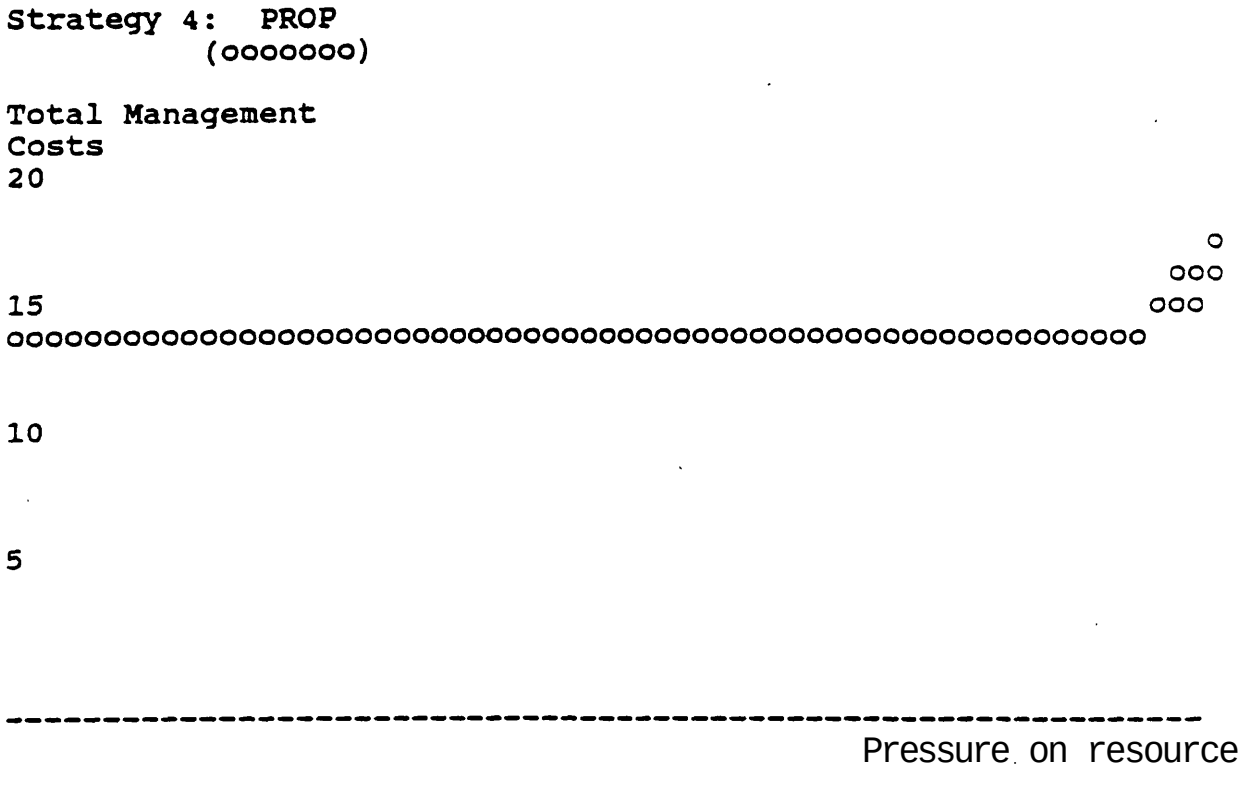
simple, like an ID card that certifies our "insider" status. Instead they have to look for something more complicated—i.e., whether we are pole fishing or surreptitiously floating a few nets as well. Just as important, there are additional user costs for the individual fishers: with RIGHTWAY they have to buy poles instead of the perhaps more cost-effective nets, and they have to spend a lot more time to get fish. On the morale point, RIGHTWAY controls might cause initial resentment because they look like a lot of silly formalities, and they may cost fisherfolk something that they previously did not **have** to pay.

On the other hand, this strategy may be more effective for controlling total uses, even under higher levels of pressure on the fishing grounds. RIGHTWAY strategies make individual fishing efforts less productive, since our fishers could have caught more with nets than with poles. Although this means that some effort is wasted, this is arguably an advantage of sorts: greater effort now does not deplete the fish, and fishers cause fewer externalities on one other.[48] And indeed, RIGHTWAY might look more attractive when there is more fishing pressure; fishers get used to the restraints and think them valuable in preventing depletion, and as a greater percentage of fishers invest in the requisite fishing equipment, it is easier for the police to catch nonconforming cheaters.

But down the line, this control strategy faces rising total costs as well. For one thing, RIGHTWAY requirements may squander fishers' efforts to an uncomfortable degree, and this may induce

cheating. Then too, RIGHTWAY controls do not explictly attend to the total take of fish, so long as each fisher is using a pole and rod; and thus RIGHTWAY restraints on nets may do little to preserve the fish if the lake is chock-full of pole-and-line fishers who fish day and night. What this means is that overuse costs start to rise. We could shift to a different version of RIGHTWAY, like permitting only flycasting, but there are costs to doing so: first of all, there are organizing costs; second, there are new efficiency losses in what amounts to the requirement that everyone use higher-effort equipment; third, there are lost sunk technical costs that existing fisherfolk have made in conventional pole-and-lines; and finally, because of all the above, there may be an increased resentment and willingness to evade new regulations.

What is left, then, is the fourth strategy of PROP, where we figure out how large a total fish-take is acceptable and auction off the rights as individualized entitlements. Here is the chart:



A PROP strategy actually may be quite cheap for resources that are easily subdivided and individualized without leftover externalities. But for fish—or for other resources we call "environmental"—the perceived expenses of a PROP strategy may be the highest of all. Initial organizational costs include some explicit decision about an acceptable cap on the fish harvest, and this may cause considerable uncertainty and conflict.[49] Then we have to figure out and define exactly what the "property right" will consist of—numbers of fish? units of catch weight?[50]

Thereafter we need to determine a method for distributing those fishing rights, whatever they are: shall we have an auction, or a giveaway to existing fishers, or some other allocation scheme? Because of the distributional issues in this

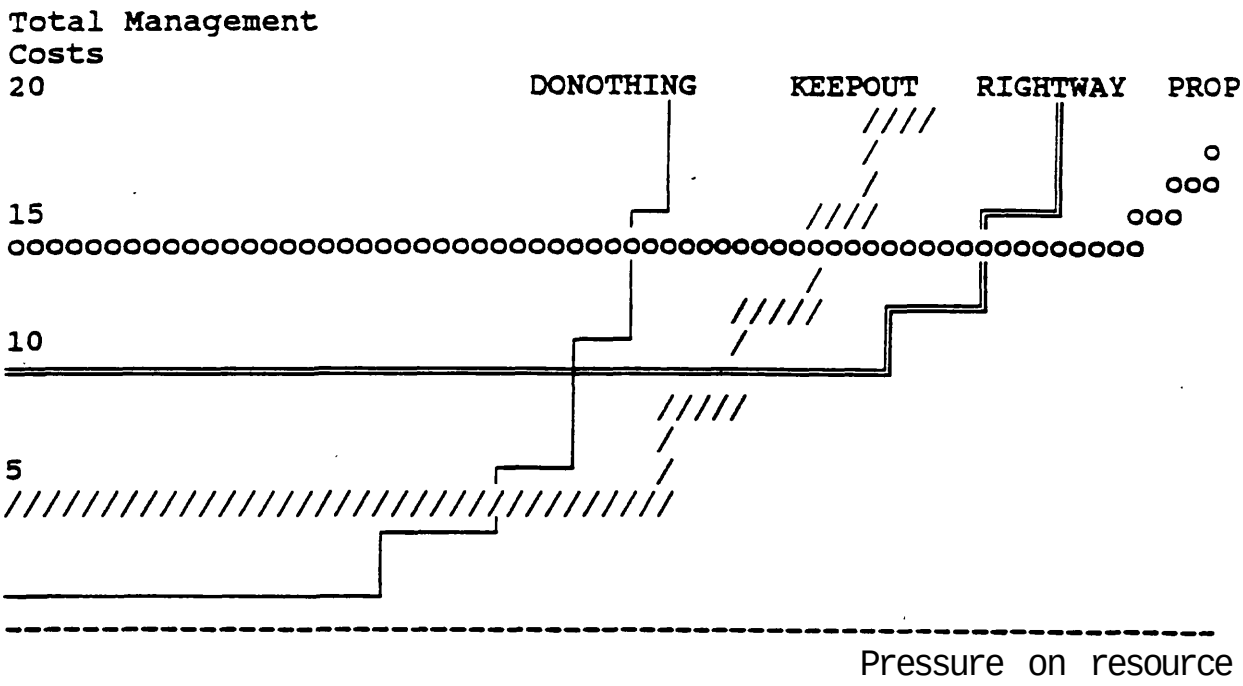
decision, it too nay cause considerable controversy—and indeed, distributional issues, along with the attendant bargaining problems, may prevent a PROP system from getting started at all.[51]

Supposing a PROP system does get in place, policing costs are likely to be high, too, since our cops cannot now just check on the fishing equipment; they have to poke around to measure the units of fish taken, to make sure that they have been properly paid for.[52] And in general, some fishers and others may resist the very idea that there should be upper bounds on fishing at all, or that anyone should have to pay for fishing; this sentiment is likely to be especially strong when we are still hovering near the congestion point, where it seems that the fish are still relatively plentiful.[53]

Despite all these costs, the PROP strategy may look better as the pressure on fishing resources grows higher. Then people may grow less resistant to the idea that undiminished ishing has costs, and should be paid for. True, as fish are increasingly valuable, fishers will have to be charged more and more for the right to fish, since undercharging might lead to overfishing;[54] but perhaps their payments can be used for a re-stocking fund or for some other conservation measures.[55] Besides, even though fishing rights cost may more and more, individual fisherfolk are not bound to any particular fishing technology: they can decide for themselves what equipment to use, and the system gives them and incentive to find to cheapest and most effective way to

extract the fish, or to get whatever other pleasures that fishing brings them. And that, is of course the basic idea of introducing an individualized property scheme of resource use: at some level of pressure on the fishery, a full-fledged property regime is the cheapest management strategy.

Many of us who teach property law think that all these control strategies represent different kinds of property regimes, but conventional usage only calls the individualized right a property right. Be that as it may, here is how the various control strategies look when one puts them all on the same chart:



If this admittedly stylized version has any relation to reality, it is pretty clear that the "best" control strategy depends on something else: it depends on how far we have travelled along the horizontal line of resource pressure.

These sketched-in figures are all "made up," of course; but

h torically, we have actually observed something like this progression in our dealings with common resources. Air pollution control gives an example. When air seemed inexhaustible, the regime was basically the first DO-NOTHING strategy of "anything goes," an attitude that probably continued longer than it should have. We acted as if automobiles and factories were effectively entitled to pollute; we thought we had to leave them alone, or perhaps to pay them to stop.[56] Despite our inertia,[57] however, gr ter pressure on air resources did seem to change our minds about the entitlement to pollute, at least to a degree; among the first results of this change-of-heart were the land use controls of the second strategy, KEEPOUT, which were designed to allay air pollution. Take, for example, the famous Slaughterhouse Cases.[58] Most legal academics dwell on the S1auahterhouse limitations on civil rights claims,[59] but those cases were also about the control of unwanted demands on air resources. What happened was that the state of Louisiana located New Orleans slaughterhouses in certain places, and wouldn't allow any new ones—an example of KEEPOUT.

After KEEPOUT, more or less, we saw the early efflorescence of the RIGHTWAY strategy, imposing controls on manner-of-use: in the later 19th and early 20th centuries, there were a number of efforts to sue factories and other air polluters in nuisance. The basic claim was that the factories used the air in a manner that went beyond "reasonable use," and the cases were decided by the standard of the customary and normal uses in the surrounding

area.[60] Our initial air pollution control laws, including the modern Clean Air Act, substantially extended the RIGHTWAY approach of nuisance law. The Clean Air Act's technology-based controls are RIGHTWAY too, though they are very complex; their essential message is that the polluter must adopt the best control devices that technology will allow (with some allowances for costs).[61] These controls also borrow from KEEPOUT, however, insofar as the technology requirments apply especially forcefully to new sources of pollution—new cars, new factories, etc.—while treating old polluters more gently.

The problem, of course, is that the costs of these RIGHTWAY technology requirements have grown very high—a matter that is frequently pointed out by proponents of the fourth strategy, PROP. Take, for example, the scrubbers that new factories must have, or the catalytic converters that new cars must have. The system costs of regulation are high, since it is expensive and time-consuming to figure out which technology is the "best available."[62] Perhaps even higher are the user costs, since every new factory and auto model must have these technolgy-based controls—even though controls might be cheaper for some factories or autos than others, and even though it might be cheaper to clean up the air by getting rid of older heavy pollution sources, and by allowing averaging-out of pollution among models and factories.[63]

For these reasons, a number of academic critics say that we should move to a PROP strategy, not only for air pollution but

for other environmental resources as well. On this reasoning, we should set total pollution limits at acceptable MAXLEVELS—roughly speaking, the point where our intolerance for health and aesthetic damage outweighs the benefits we get from more pollution from things like cars and factories—and then define and auction off individual "chunks" of pollution up to those limits.[64] These pollution rights would be expensive, and ever more expensive as as pressure on the air resources rises. But rising costs would give polluters an incentive to find ways of holding back their pollution at low levels, without the awful expense of defining and prescribing a rigid "best available technology."

The PROP-based pollution rights approach has now become quite a la mode, and it plays an increasing role in our environmental law. On the whole, polluters do not bid in dollars for pollution rights, but under some circumstances they may make in-kind barter bids: they may be permitted to emit air pollution if they can clean up even more pollution from other plants, such as old dry cleaning establishments and bakeries.[65] The idea, of course, is to get greater air cleanup at lower cost.

At the moment, however, there is still considerable controversy about whether the third RIGHTWAY strategy or the fourth PROP strategy is preferable. The current counterattack on PROP, by proponents of the RIGHTWAY technological controls, focuses largely on some items that are predictable from this article's model. Those items are comparative costs—that is,

system costs, user costs and overuse or failure costs. Probably the most important criticism entails an issue of system costs that may spill over into overuse/failure costs. RIGHTWAY proponents of technology controls argue that it is very difficult for administrators to find and set tolerable maximum levels for many pollutants; this is especially the case, they say, for highly toxic materials that we can't test very well, but that may be damaging even at very low but now-unknown levels. If we wait until we've done done all the testing and collected all the information about our acceptable thresholds, we may effectively do nothing for a very long time—and in the meantime we may suffer grievous consequences.[66] Thus, to use this article's terms, the high system costs spill over into failure/overuse costs. RIGHTWAY technology controls, the other hand, avoid the problem of setting levels explicitly; they just say to polluters, "do the best that technology allows," and thus they arguably provide protection even when we aren't really sure what level what hurts us.

RIGHTWAY proponents also have another critique of PROP'S administrative or system costs, stressing the comparative costs of downstream policing. If we impose RIGHTWAY controls, the argument goes, our downstream policing costs are relatively cheap, because all we have to do is look to see if the required technology—the scrubber or whatever—is in place and in working order. But if we start handing out pollution rights, as we would under PROP systems, how do we know that the recipient is not

cheating? We would have to test ambient levels of air or water or whatever, and those are difficult, expensive, or error-prone. It is a lot easier, it seems, just to check to see if the factory in question has all its scrubbers in place—that is, whether the factory is using the air in a prescribed way.[67]

This article's model suggests that the solution to the relative-cost controversy depends on how congested our air really is. If we are far enough out on the horizontal line of resource pressure, PROP may be preferable because it minimizes total costs, despite its arguably higher system-wide costs of organization and policing. The PROP strategy is likely to bring savings in the technology costs of individual air users, and most important, if we make the necessary monitoring effort, it should have lower failure or overuse costs for air resources. This is because all air pollution would be explicitly limited, "propertized," and paid for, and because users now would have an incentive to minimize pollution. All those lower costs may mean that PROP is a lower-cost total package, at least where there is high pressure on resources. The RIGHTWAY strategy, though arguably cheaper administratively (a hotly contested point, of course), still has high technological user costs, and may have especially high failure or overuse costs, since it could leave a lot of uncontrolled pollution in the air. We have to consider that it is the reduction of total costs that we are after; and when our available air resources come under a sufficient pressure, PROP'S total costs may be less than RIGHTWAY's.

6. HIDDEN COSTS

The arguments for PROP are very powerful in many areas of environmental law, perhaps because our demands on these congestible environmental resources grow ever higher. But there is a subtle problem with PROP, and I do not think it has been sufficiently addressed by the proponents of this strategy. It has to do with a certain normative component of environmental law that tends to be overlooked by PROP proponents. This normative component surfaces in a fairly commonplace complaint about PROP. The complaint is that PROP systems permit some people to pollute if they pay enough, whereas in principle, everyone should be doing all s/he can not to pollute. The argument seems to have a certain intuitive force, and it tends to be made, among others, by public interest groups who prefer technology-based RIGHTWAY approaches.[68]

A related complaint is only implicit, but has something of the same flavor: one reason for RIGHTWAY's attack on PROP may have to do not so much with total costs as with the distribution of costs. RIGHTWAY's command-and-control approach puts a great load of costs on the individual air users, in the form of technological pollution control devices that they must use. PROP, on the other hand, with its higher downstream policing costs, seems to have proportionately higher administrative or system costs—and those higher system costs seem to Bean that PROP allocates a greater proportion of pollution control costs to the public, and rather less to the polluter.

Now, there is no reason why, under a PROP regime, the sale proceeds of marketable pollution rights could not be cycled back to pay the higher costs of policing that PROP requires, but this is rather indirect. At least at first blush, RIGHTWAY seems to locate abatement costs more directly on the polluter, and to some, that undoubtedly seems the fair and just approach. And in general, RIGHTWAY strategies seem to carry a rhetoric of responsibility, a principle that everyone should be doing her best not to pollute.

This rhetorical issue calls for a return to our earlier list of available control strategies. There is one control strategy that I deliberately neglected earlier, but I wish to bring up now. That strategy is moral suasion or exhortation. In its crudest form, exhortation is an appeal to the goodwill and sense of common duty of the citizenry; exhortative control strategies ask the citizens to refrain from overuse of the air, the water, the land and its growing things. Exhortative strategies appeal to the citizenry to recycle bottles and paper, to drive autos less and to walk more, to use roll-on deodorants instead of aerosols.

Now, a number of commentators on environmental matters regard exhortation as something that brings few results; exhortation on this version is another version of the most primitive first strategy, that is, DO-NOTHING. According to William Ophuls, for example, exhortative appeals will accomplish little in the vast n-person prisoners' dilemma of environmental

problems; what is required is some version of Hobbesian coercion.[69]

Is this true? My colleague Robert Elllickson has pointed out repeatedly that a number of property regimes are informal and essentially voluntary, and have little or no support from coercive legal systems. Indeed, these regimes may be quite contrary to the formal law, but are followed on principles of neighborliness.[70] We have all seen countless examples, and they are by no means confined to relations with acquaintances or neighbors, from whom we might expect reciprocal benefits: we stand in line at the movies, we respect other people's placemarkings (books, coats) at library tables, we hand change back to the cashier who has undercharged us.[71]

Given the prevalence of this type of behavior—sometimes at considerable cost to the persons involved, and with no hope of recompense—it may not seem so laughable to think that people may be swayed by their perceptions of what they think is the right thing to do. Not too long ago, for example, Minnesota park officials reintroduced moose into the North Woods. When asked whether they feared that people would harass and hunt the animals, the officials offered the opinion that the populace was so excited about the moose that no one would pester or kill them.[72] Now this may be wishful thinking, since it does not take many bad apples to ruin a program of this sort.[73] But it does not seem altogether implausible, either, that the citizenry would try to do the right thing even in so fragile an experiment

as this.

Indeed, a whole body of literature is emerging that stresses the importance of norms in structuring human behavior, precisely in the prisoners' dilemma situtations in which one would most expect noncooperation.[74] For our purposes, the point is that if we do have a good deal of voluntary cooperative behavior, even in n-person prisoners' dilemmas, then it may not be entirely foolish to think that the norms that induce this behavior can be of some considerable importance in our regimes for protecting the environment.

That is the first point about exhortation or moral suasion: it may affect norms, and norms may affect behavior. A second point is that we cannot consider exhortation in isolation; we have to compare exhortation to the coercive systems that some seem to think necessary. Coercive systems are not cheap. As this article has pointed out, even though some coercive systems are more expensive than others, all involve regulations and police and related administrative apparatus, and all are costly. By comparison, exhortation or moral suasion is cheap.[75] If we are thinking about effectiveness-per-dollar, then, moral suasion might not look so bad.

Even if we were to agree, for the sake of argument, that exhortation has an effectiveness level of next-to-nothing as a control strategy, next-to-nothing might be all we need in some instances. At relatively low levels of pressure on a given resource—when we are still just a small step past our congestion

point, and when competing users have not yet become thoroughly vexed with one another—moral suasion might indeed be the most cost-effective means of restraining overuse of a resource. Thus even on the most pessimistic view—that is, that exhortation might not do much—talk is still cheap; when not much needs to be done, exhortation might be our best bet.

However, I am not willing to concede that exhortation of moral suasion is so ineffective. That brings me to a third point, one that goes back to a problem posed earlier in this paper: suppose a group of common resource users (fishers, or air users, or whatever) realize that they need a management system: how do they ever get themselves together on a common scheme? Even if the best scheme would be a coercive one, how do they all get together to select the appropriate Leviathan, and invite him/her to take over? Government or management systems are "commonses" too, and if citizens cannot agree on their respective use of the resource, how can they agree on its management system?[76] Instead of creating a management system, why do they not squabble and jockey and shirk and hold out and, putting it generally, undertake all those behaviors that are so often predicted for the Prisoners' Dilemma?

What they are going to need is some version of moral suasion to induce them to trust one another, and to undertake their respective shares of a management system. I have argued elsewhere that storytelling or narratives are especially important in creating the social and moral community in which the

participants can exercise some trust, and some measure of self-discipline.[77] These may be stories of a common past and of a history over time, as one often sees in constitutional discussion.[78] In the environmental context, on the other hand, the stories are most likely to paint a picture of lost or threatened purity and an intensely horrible future—unless, of course, we change our evil ways.[79] But whatever directions they take, narrations are a way of bridging gaps, creating a community and persuading the members of that community to take certain steps in common.

And so, while it is unquestionably the case that hard-nosed approaches to environmental problems can be most useful and illuminating, their proponents' contempt for moral suasion is somewhat unrealistic. Complete noncooperation will cause any management scheme—including a property regime—to collapse before it even begins. Even the most hardnosed property-rights systems may depend on something like education or moral suasion, to convince everyone to respect the property of others.[80]

This brings me back to the RIGHTWAY proponents' crititism of the PROP strategy. Exhortation or moral suasion is a hidden rhetorical component in all the control strategies, but the different strategies differ rather substantially with respect to their educational or hortatory thrust. I will leave to one side the KEEPOUT strategy of excluding of new uses, except to note that it carries a moral message of self-protectiveness, as has been noted of the exclusionary zoning techniques in land use

(some of which may look like environmental protection);[81] or in the so-called NIMBY syndrome that increasingly plagues the placement of locally-unwanted land uses.[82] Sometimes there may be important distributional or cultural reasons for these seemingly self-interested arrangements, as for example in the case of the protection of resources for indigenous peoples;[83] but aside from these specialized circumstances, the control strategy that keeps out newcomers is not normally telling narratives of generosity, understanding and helpfulness, at least with respect to the world at large—though of course it may be doing so with insiders.

As to RIGHTWAY and PROP strategies: these two strategies also carry differing moral freight. RIGHTWAY, focussing on the way resources are used, carries the message that at a minimum, one should use congestible common resources in a "reasonable" way, and one should respect one's neighbor's equal rights. That is the jist of the older nuisance law, an early RIGHTWAY regime. The more recent versions, in technology-based approaches to environmental protection, up the moral ante: they tell each would-be polluter that s/he must do her best, and they do something to create a larger culture in which the expectation is that everyone must do his or her best.

This, I think, is the basis of the RIGHTWAY proponents' most fervent attack on PROP: PROP loses this moral thrust by surrounding pollution with rights-talk, by using a rhetoric of entitlement to pollute. When we reconceptualize the use of

common resources as individual property rights, we attenuate the moral rhetoric of contribution and trying harder for the common good; this is so even though economic incentives may persuade would-be polluters, on self-interested grounds, that they indeed should try harder.

One may be extremely sympathetic to PROP'S entitlement/market approach, especially at high levels of pressure on common resources; as I have said, the arguments in favor of this strategy are extremely powerful and become ever more so as our common resource are ever more strained. One may also think that there is a self-defeating element of cant and hypocrisy in some of our current versions of RIGHTWAY, especially insofar as it is combined with KEEPOUT's favoritism to existing uses, and insofar as "best available technology" requirements may unequally burden enterprises that have already been doing their best, to the competitive advantage of others who have never tried so hard at all.[34] But in spite of these gaps in the practice of RIGHTWAY, it may be well to consider that the adoption of the sophisticted PROP techniques, as a general matter, may come at the price of a diminution in a certain element of moral suasion. In turn, this moral diminution may work against the overall effectiveness of PROP, by creating a cultural climate in which one is not expected to do the right thing unless it is in one's direct interest to do so.

It is not simply ludicrous to think that when we compare the RIGHTWAY and PROP strategies—the chief competitors in our

current environmental debate—we might take this differing moral component into account. I am not saying that RIGHTWAY should automatically prevail, particularly in some of its current incarnations in our environmental law, but only that it has one larger hortatory advantage—and PROP a hortatory disadvantage—that should be a part of our calculations.[85]

CONCLUSION

Summing up, then, this article has tried to make a number of points about the ways that we might manage the environment. The first point is that environmental goods are often not only common goods but are congestible goods, in the sense that they may be used by a number of people before their congestion becomes uncomfortable or otherwise unsuitable for the resource. But second, at some level of use, increasing usage does become uncomfortable or unsuitable, and it is at that point that we may begin to think, about management strategies for environmental goods. Third, we can categorize several different management strategies for such goods; but these strategies have different cost structures, so that there is no absolute "best" strategy. Instead (and fourth) the choice of the best strategy, in the sense of the least-total-cost, depends on what I have called the level of "pressure" on resource.

There are several implications of this series of points, not all of which I can pursue here, but some of which are as follows:

a. Environmental resource valuation. A first implications

is that by paying attention to the relative costs of resource management strategies, we learn something about the reason why environmental resources are so difficult to value—and of course, valuation is a matter of great interest in environmental law.[86] Because resource management always costs something, it may not be worth the effort to adopt a management system for a given resource, especially not a sophisticated PROP system; and this in turn means that there is no easy and conventional way to price the resource. This does not mean that the resource is valueless--far from it; what we need to realize is that our difficulties in pricing the resource stems not from its lack of value, but rather from the costliness of a property regime that might manage it, and that might derivatively give us an easy (market) way to price it. When a property rights regime is too expensive, we need other evaluative techniques to substitute for market pricing.

Indeed, the costs of management regimes might suggest some alternatives in the valuation of environmental resources. A common evaluation technique for unique items is the use of something like opportunity costs; evaluations based on replacement cost or historic cost ask: how much are the resources worth that are (or were) used up in creating this item? With environmental resources, e.g. fish under a cultural practice of KEEPOUT, we might ask how much fishermen commit their efforts and equipment to getting the fish, to glean some notion of how much they are spending on getting this resource; this gives us at least a lower limit on the value that people put on securing

access to a resource. But the fish should be worth more to the fisherfolk, too; we need to go on, because the regime of KEEPOUT itself costs something to the fishers.

In addition to individual expenditures, then, how much does the cultural regime itself cost the community of fishers? Culture involves investment too, and its cost should be an element in figuring out a floor for the value that existing users place on culturally-managed resources. We may not be able to figure these costs directly, but surely other branches of our law suggest indirect evaluative techniques for the relevant time and effort spent on creating and maintaining a cultural regime. This of course does not take into account the valuation put on fish by people for whom fish have only "existence value,"[87] but we might get some idea of the nature of "existence value" by thinking about the costs of a management strategy that would serve that value.

b. Selection of resource use levels. This article has deliberately put to one side the issue of setting of ambient levels of resources, or as I have put it, setting the MAXLEVEL that allows a resource to be used but also to regenerate at acceptable levels;[88] I have been assuming a fixed MAXLEVEL, so as to simplify the analysis of management costs. Nevertheless, the cost structures of different management strategies clearly bears on our choice of those overall MAXLEVELS. As mentioned earlier, we do get some value out of consuming a given environmental resource, and we might well take the point of view

that its ambient levels—the point at which we want the resource to renew itself steadily—should be set to get the maximum benefit for the lowest total cost.[89] But we should now see that different managements strategies have different cost curves. Thus, for example, if we suppose there is increasing pressure on some resource, a high level of protection might not be worth the cost if we were to stick with, say, KEEPOUT; the costs of defending against outsiders might eat up all the gains. But it might be worth the cost if we were to switch strategies to the more sophisticated RIGHTWAY (or perhaps PROP), because at some levels of resource pressure, those more complex strategies are cheaper, despite their complexity. Thus management costs figure back into the choice of ambient or MAXLEVELS; we need to keep an open mind about the possibility of switching strategies when we figure out how protective our environmental laws should be. Thus even if we have been spending a lot on KEEPOUT (or RIGHTWAY) strategies to protect a resource at some given level, we might nevertheless be able to afford greater protection if we shifted to a PROP strategy.

c. "Takings" issues. Still another implication has to do with the "Takings" issue in constitutional property law. If our management strategies do show a rough evolution from doing nothing, through the exclusion of outsiders, through manner-of-use control, to individualized property, then this evolution should shape our views of entitlement. A strategy of doing nothing—"anything goes" or open access—seems to allow a fisher

or a user of air to do anything s/he likes to the common resource. But this lenience may be contingent upon the relative bounty of the common resource, and upon the corresponding absent of perceptible externalities from its use.

We notice these externalities as the resource become less plentiful—that is, at some congestion point; and it is at that point too that we may start to shift our views of where the entitlement lies. The entitlement that used to seem the property right of the individual user—e.g., the "right" of the factory to pollute—may shift in our thinking to the commonality—e.g. the "right" of the community to regulate pollution. This shift occurs as we notice that the commons is a limited one after all, and as we notice that unless the community exercises some control, the resource may be exhausted altogether. I would suggest that our "takings" issues are likeliest to occur as we reach and pass a congestion point, since it is here that common regulation is most likely to attempt to control practices that individuals may have come to see as entitlements in more plentiful days.[90]

d. Environmental management by norms. By far the most important implication is that we need to pay more attention to the relatively underdiscussed management strategy of norm-production—moral suasion or exhortation. Our acts and words convey varying messages about what it means to "do the right thing," and in any given culture, those words and messages may affect the way we use common resources. The more formal

manager it strategies all have some component of norm-production or moral suasion: each delivers some message about what the right thing to do might be. These moral components differ from each other. For a truly comprehensive evaluation of the different management strategies, we need to compare the normative advantages or disadvantages of different strategies, alongside their other advantages or disadvantages. Normative or hortatory factors count too, in the institutions we adopt to manage and renew resources for ourselves, our neighbors, and our children.

NOTES

1. One of my favorites is EPCRTKA, for the Emergency Planning and Community Right-To-Know Act, 42 U.S.C. 111001 - 11050, also somewhat less forbiddingly known as a part of SARA, the initials for the Superfund Amendments and Reauthorization Act.

2. See, e.g. M. Sagoff, The Economy of the Earth 35-39 (1988) (contrasting economic considerations to ethical values) ; cf. W. Baxter, People or Penguins: The Case for Optimal Pollution 7-8 (1974) (for efficient environmental solutions, rejects idea that ethics call for something different).

3. See, e.g. William Ophuls, Ecology and the Politics of Scarcity 147 (1977) (ecological resources are commons).

4. Id. [Ophuls at 147]

5. The idea of the tragedy of the commons itself may have begun on the example of fishing, namely Gordon, The Economic Theory of a Common-Property Resource: The Fishery, 62 J. Pol. Econ. 124 (1954) ; see Ciriacy-Wantrup & Bishop, "Common Property" as a Concept in Natural Resources Policy, 15 Nat. Resources J. 713, 719, 722 (1975) (citing Gordon's article as originating literature on "tragedy of the Commons"). See also A. McEvoy, The Fisherman's Problem 10-11 (1986) (on longstanding understanding of "fisherman's problem" of resource depletion).

6. Id. [Ophuls] at 149-50.

7. Even the conservationist might not restock, given the possibilities that hatchery-bred fish might harm the genetic makeup of the wild breeds.

8. Dean Lueck distinguishes the negative and positive aspects by distinguishing between two sorts of "commons": one sort has open access, and the characteristic problem is overuse of the common resource; the second sort has common ownership or output sharing, and the characteristic problem is shirking. See his paper, The Productive Role of Common PRoperty: Why the Commons are so Common (forthcoming).

9. For the "prisoners' dilemma" see Hirshleifer, Evolutionary Models in Economics and Law: Cooperation Versus Conflict Strategies, 4 Res. L. & Econ. 1, 17 (1982) ; for same in large number context, see M. Ullmann-Margolit, The Emergence of Norms 25-27 (1977).

10. My former colleague James Krier makes this obvservation on almost every occasion that the subject comes up. See his and Jesse Dukeminier's casebook, Property 46-47 (2d ed. 1988), and

authorities cited therein (commenting on conceptual leaps in academic discussions of emergence of private property). See generally, R. Hardin, Collective Action (1982); see also Rose, "Enough and As Good" of What? 81 NwU.L.Rev. 417, 438-39 (1987) (organizing management regimes presents collective action problems).

11. R. Hardin, supra note ———, at 36-37 (political entrepreneurship).

12. See generally, Margolit-Ullman, supra, at —— (noting that cooperative solutions to prisoners' dilemma problems are predictable); see also R. Frank, Passions within Reason: The Strategic Role of the Emotions (1988) (concerning role of emotion in arriving at cooperation); R. Ellickson, Order Without Law (in press, Havard University Press) (examples of cooperative behavior among neighbors); Acheson, The Lobster Fiefs Revisited, in B. McCay and J. Acheson, eds, The Question of the Commons: The Culture and Ecology of Communal Resources (1987) (same).

13. See, e.g. Barnes, Enforcing Property Rights: Extending Property Rights Theory to Congestible and Environmental Goods, 1 Envt'l Affairs 583 (1982-83).

14. This graph is a variant on that of Barnes, note —— supra, at 593.

15. The problem is compounded when Group A depletes a resource, but only Group B notices it, as for example in the case of acid rain, where Mid-Western coal-burning plants emit air-borne particles that cause their damage chiefly in New England and elsewhere.

16. See Krier, Commentary: The Irrational National Air Quality Standards: Macro- and Macro-Mistakes, 22 U.C.L.A. L.Rev. 323, 328 (1974) (arguing that clean air may come at the cost of production, employment benefits that are more valuable; and that this trade-off varies from location to location).

17. In principle, we may be able to calculate at an exloitation level that maximizes,economic rents for a given renewable resource, from the point of view of the exploiting parties; this is what Gordon's classic article about the fisheries did. See Gordon, supra note ——, at 129-141 (describing rent-maximizing fishing effort, also explaining why this effort is generally exceeded); see also Townsend and Wilson, An Economic View of the Tragedy of the Commons, in B. McKay and J. Acheson, supra note ——— at 311, 317 (describing Gordon's argument). In practice, however, a number of other interests, aside from those of the exploiting parties, often bear on an ideal MAXLEVEL. An ideal MAXLEVEL for a given fish type, for example, might depend not only on commercial rent-maximizing catches, but also such matters as the recreational

enjoyment of viewing and photographing fish; profits or losses from increases in competing species, as the exploited type diminishes; alternative uses of fish habitat for real estate development or pollution storage, and so on. In principle, a single owner of all relevant resources could presumably arrive at a ideal MAXLEVEL for all of them, equalizing values at the Margin. In practice, since we have no single owner, I assume that MAXLEVEL decisions are at least partially communal or political, as a kind of second-best decision-making process.

18. Cf. Miller, When Bureaucrats Cast for Fish Names, Be Prepared to Wait, Wall St. J., May 1, 1980, at 1, col. 4 (Fishery Service effort to rename fish, e.g. ratfish, grunt, hogsucker, mudblower—to make them more commercially attractive) .

19. Insofar as resource management schemes impose increased costs on resource users, of course, their demand for the resource will be reduced. See Barnes, supra note ——, at 592-95 (noting effect of controls on resource use).

20. See, e.g. Ostrom, Institutional Arrangements for Resolving the Commons Dilemma: Some Contending Approaches, in B. McKay and J. Acheson, supra note ———, at 250, 250-51.

21. See, e.g. G. Libecap, Contracting for Property Rights, 16-26 (1990) ; McChesney, Rent Extraction and Rent Creation in the Econmic Theory of Regulation, 16 J. Legal Stud. 101, 102-103 (1987); see generally J. Buchanan, R. Tollison, & G. Tullock, Toward a Theory of the Rent Seeking Society (1980).

22. See Acheson, supra note ——, at 59-60 (describing governmental moves to adopt private control patterns of lobster fishing). A similar blurring of public and private occurs the governance structure of private residential communities, which manage common property in ways resembling public goverance, including majoritarian rule-formation and tax-like assessments. See Reichman, Residential Private Governments: An Introductory Survey, 43 U.Chi L. Rev. 253 (1976) ; see also Alexander, Dilemmas of Group Autonomy: Residential Associations and Community, 75 Cornell L. Rev. 1 (1989) and literature cited therein.

23. Cheung, The Structure of a Contract and the Theory of a Non-Exclusive Resource, 13 J. L.& Econ. 49, 64 (1970).

24. See, e.g. Manchester Environmental Coalition v. EPA, 612 F.2d 56 (2d cir. 1979). These so-called "indirect source" controls have been controversial when imposed by federal administrators, however, as is evident in this case, and in the Congressional response forbidding the Environmental Protection Agency from imposing such land use restrictions on unwilling states. See Clean Air Act sec. 110(a)(5)(A).

25. See, e.g., Middlesex Company v. McCue, 149 **Mass.** 103 (1889) (no nuisance action against cultivation in ordinary and usual manner).

26. See, e.g. Clean Air Act, sec. lll(a)(l), 42 U.S.C. sec. 7411(a)(1)(technological performance standards for new sources); sec. 202(a)(3)(iii), 42 U.S.C. sec. 7521(a)(3)(iii) (same for autos}.

27. See, e.g. Comment, Ackerman & Stewart, Reforming Environmental Law, 37 Stan. L.Rev. 1333 (1985); Dudek & Palmisano, Emissions Trading: Why is the Thoroghbred Hobbled? 13 Colum.J.Envt'l Law 217 (1988).

28. FOOTNOTE TO FOLLOW, WHEN NEW CLEAN AIR ACT FINALLY GETS PASSED.

29. Atchison, The Lobsterfishermen of Maine, supra note ——, at ----.

30. See note —— supra [CAA sec. 111, 204]. Old plants may be subject to state controls under other parts of the Clean Air Act, but these controls may be much less stringent. See the discussion in National-Southwire Aluminum v. U.S. EPA , 838 F.2d 835 (1989 (plant effort to avoid redesignation as "new source," subjecting it to additional technology requirements) . Favoritism to old users can be critized on grounds of fairness and efficiency; a fervent critic is Peter Huber, e.g. in The Old-New Division in Risk Regulation, 69 Va.L.Rev. 1025 (1983) (new equipment may pose fewer risks, should be encouraged). The major arguments in its favor are: 1) retrofit costs: higher than costs of new plants with pollution control equipment; 2) redistribution: old devices, especially cars, typically owned by lower income segments. See also Ackerman and Hassler, Beyond the New Deal: Coal and the Clean Air Act, 89 Yale L. J. 1466, 1478 (1980).

31. See Cheung, supra note —— , at 64 (all systems costly), 67 (costs of delineating rights may be prohibitive) ; Krier, supra note —— [UCLA], at 326; Lueck, supra note ——.

32. Krier, supra note ——[UCLA], at 326. Krier's article, among other things, considers the costs of overcontrol—that is, setting controls too stringently, and failing to account for the benefits that may come from some use (pollution) of air resources. This article holds that cost constant, by assuming that we have already choosen the MAXLEVEL we want; the costs considered here are the management costs of holding resource use to that level. See TAN —— supra. [MAXLEVEL's first appearance]

33. In the various article on "commons" in B. McKay and H. Atchison, supra note ——, the reference to "pressure" comes up often, e.g. 105, 126, 129, 247, 256; see also G. Libecap, Contracting for Property Rights 15 (1990) ("fishing pressure"), 64 ("grazing pressure").

34. G. Libecap, supra note ——, at 16.

35. See Gordon, supra note ——, at 129-130, 141.

36. Gordon, supra note—— at 131-32.

37. A similar idea is implied in G. Libecap, supra note ——, at 16, noting that a resource's price increases (or production cost decreases) can add to motivation to "adjust property institutions" to prevent rent dissipation. Presumably "adjustment" costs something, however—that is, dissipates rents.

38. See, e.g., Krier, supra note ——[UCLA], at 326 (total costs of pollution control comprise costs of pollution itself plus costs of preventing pollution) . There is a tendency in some property rights literature, however, to downplay the costs of management in the form of conventionally defined property rights, and to accept without more that conventional property rights are less expensive than other management systems. For example, in Anderson and Hill, The Race for Property Rights, 23 J. Law & Econ. 177, 181-82 (1990), the authors note the rent-dissipating effects of western land acquisition by homestead and squatting, and compare these methods unfavorably to transfers by sale; but no mention is made of the possibility that transfers to homesteaders and squatter (i.e. on-the-spot farmers) might have economized on policing costs, by comparison to sales (to at least some absentee owners).

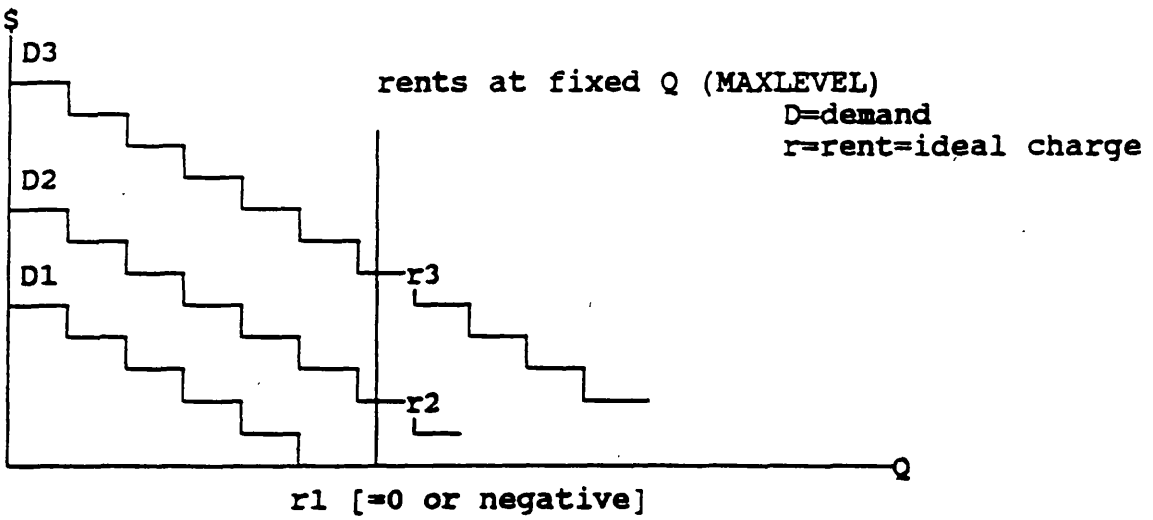
39. There are a number of interesting graphics in the fishery branch of legal thinking. I found the most helpful to be Gordon's, supra note ———, at 137-140, along with the explication by Townsend and Wilson, supra note ——. at 314-15, 317. These graphics show a relationship between fishing "effort" (on the horizontal) , and fishing revenues together with costs (on the vertical), and illustrate the point that maximum economic yield is the rent-maximizing point at which costs are at the greatest distance below total revenues. They also illustrate, of course, that the maximum economic yield is not an equilibrium point if fishing effort is unrestrained.

I was sorely tempted to follow these established graphics, and to use "effort" on the horizontal. But in an important way, "effort" simply responds to rents (i.e. the prospect of rents makes fishers expend "effort"). More important, the direct use of rents (or "pressure") instead of "effort" enabled me to graph the rising costs of management regimes under increasing demand for a resource. The picture would be muddied by using "effort" on the horizontal, since effort is one of the things changed by management. See also

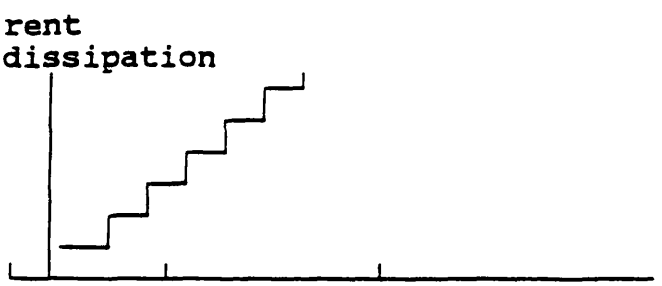
next two notes, infra.

40. Though I am using the less formidible term "pressure," technically speaking, this pressure on the resource should be considered the resource's "rent," since it is increasing rent that attracts more numerous and more intense efforts to take a resource.

One could envision any given pressure or rent level as the amount that the whole community of fishers would charge itself, in order to ration the fish taken and keep the total fish at the appropriate renewable level. The correct amounts would of course vary with the demand for the fish (no matter what the source of that demand) . Thus in a conventional scheme, the supply of fish would be a vertical line (since the number to be taken is fixed *a* some renewable MAXLEVEL), intersected by the demand line(s) . Thor intersections (rl, r2 etc.) represent the ideal charges constrain usage at the chosen MAXLEVEL; if they could be costless imposed on fishers, they would effectively limit fishers to the ideal harvest amounts that would allow fish to renew at the level they want.



In the graphs that follow, I am turning these intersections on their side to the horizontal, to represent "resource pressure" levels. The verticals represent dissipation of rents due to management costs and continued overfishing. See also next note.



r1	r2	r3	rents at MAXLEVEL (resource pressure)

41. The remaining undissipated rents may benefit different parties. Under strategies 1-3 (DO-NOTHING, KEEPOUT, RIGHTWAY) the residual rents go to the fishers themselves, whereas under strategy 4's property regime, the residual rents may be collected by the management or government rather than the fishers, perhaps to be used for restocking or other resource conservation measures. But no matter who gets these rents, the object in choosing a management strategy should be to maximize the residual rents—that is, the difference between rents and dissipation of rents. If rents are completely dissipated by a management strategy—e.g. if under a KEEPOUT strategy, it costs a group of hunters more to guard their hunting grounds than the animals bring them—they may simply abandon efforts to manage the resource, and allow it to turn into a wasting asset—unless, of course they can shift to a less rent-dissipating management scheme.

42. Townsend and Wilson, supra note ——, at, 313-17, give a graphic representation of this feature of fishery exploitation, suggesting a smooth relationship between fishing catch and fish depletion. They point out, however, that an alternative theory suggests , a discontinuity in the relationship between catch and depletion; the idea is that wildlife may continue to regenerate, albeit at somewhat unpredictable levels, up to some critical exploitation level; but beyond that critical point, the wildlife stock will deplete very rapidly. Id., at 321-23. Some historical American examples might corroborate this view, for example the dramatically sudden depletion of previously numerous passenger pigeons or bison; see J. A. Tober, Who Owns the Wildlife? The Political Economy of Conservation in Nineteenth-Century America 93-102 (1981) . Fear of passing such a critical point-of-no-return may also animate current discussions of other resource overuse issues, notably the "greenhouse effect" thought to arise from the release of air pollutants into the upper atmosphere.

43. This was the chief message of Gordon's classic article about the fisheries, supra note ——; in the absence of restraints, fishers are attracted into fishing by the prospect of AVERAGE productivity that is higher than MARGINAL productivity; thus their additional fishing will deplete the resources for other fishers as well as for themselve and bid away rents, and, as Gordon said, "[t]his is why fishermen are not wealthy." Id. at 130-31. Where fishers do manage to limit access, however, they may enjoy higher catches with less effort; see Acheson, Maine Lobsterfishers, in B. McKay & H. Acheson, supra note ———, at 55-57.

44. Gordon, supra note ——, at 132.

45. See Yandle, Resource Economics: A Property Rights Perspective, 5 J. Energy Law & Pol. 1, 5 (1983) (in conditions of plenty, cost of constructing property institutions may exceed benefits).

46. Libecap, supra note ——, at 12-14 (common pool losses motivate efforts to establish more exclusive property rights).

47. See Acheson, supra note ——, at 44-45, 52-57 (describing "perimeter-defended" lobster fishing areas) .

48. See, e.g., Agnello & Donnelly, Property Rights and Efficiency in the Oyster Industry, 18 J. Law & Econ. 521, 523 (1975) (required labor-intensive methods inefficient) . For a proposal to increase technical costs IN ORDER TO raise prices, see Natural Resources Defense Council (NRDC) arguments in NRDC v. Ruckelshaus, 655 F.2d 318, at ——— [pt. C, obj. to TSP] (D.C. Cir. 1981) (technical requirements on auto engines should increase diesel engine costs, make them less attractive, because of dangers of their pollution) .

49. For an analogous problem in the air pollution area, the setting of ambient standards for air pollution has proved difficult, e.g. for lead. See Natrual Resources Defense Council v. Train, 545 F.2d 320 (1976) (suit to force EPA to adopt ambient lead standards); Lead Industries Assn. v. EPA, 647 F.2d 1130 (D.C. Cir. 1980, cert, denied 449 U.S. 1042 (1980) (challenge to standards ultimately adopted).

50. For environmental resources, defining the appropriate entitlement might be quite tricky. For an example, see Note, A DRASTIC Approach to Controlling Groundwater Pollution, 98 Yale Law J. 773 (1989) (property-based groundwater control proposal, with permits based on analysis of seven different factors about acquifer, soil, other groundwater characteristics).

51. See G. Libecap, supra note ——, at 16-19 (noting impediments to revision of existing distributions) ; see also 19-26 (noting other sources of bargaining difficulty). Another reason for inertia may be the front-end investment for any control strategy: in a sense, no new strategy may seem "worth it" as we cross the congestion point, because startup costs are high. Moreover, there may be a psychological resistance to a shift to new management system, insofar as an existing set of entitlements may always tend to appear more valuable than a different but still hypothetical set. For the importance of some findings of cognitive psychology to legal regimes, see Krier and Noll, Some Implications of Cognitive Psychology for "Risk Regulation, 19 J. Legal Stud. 747, 765-67 (1990) (overvaluation of status quo, undervaluation of change).

52. Here again environmental resources may present great difficulties. See Yandle, supra note ——, at 17 (noting difficulties of measuring and monitoring groundwater for property rights scheme.)

53. See, e.g. Gordon, supra note ——, at 126 (describing 19th century British arguments for relaxing all fishing restrictions — grounds that fish were inexhaustible). The rejection of wildlife management techniques, noted among some indigenous peoples, may be related to a belief that wildlife are inexhaustible. See, e.g., Brightman, Conservation and REsource Depletion. The Case of the Boreal Forest Algonquians, in B. McKay and J. Acheson, supra note ——, 121, at 130-32 (promiscuous wildlife hunting among 13th century Cree, belief that wildlife unaffected by hunting); this may change with the perception of wildlife depletion; id. at 123 (indiscriminate hunting now equated with disrespect for animals) .

54. See note ———, supra [re rents].

55. See note ——, supra [re transfer of residual rents from user to management agency] . For an example, see the suggestion of Ackerman and Stewart, that property-based emission permits could fund the environmental management agency, supra note ——, at 1343-44.

56. For autos, see J. Krier and E. Ursin, Pollultion and Policy. A Case Essay on Calofornia and Federal Experience with Motor Vehicle Air Pollution 1940-1975, at 98-99 (1977) (California's regulators initially thought they could not act against auto pollution so long as no pollution control device available) ; 257-63 (general pattern in which no action taken until harms are certain). For factories, see A.G. Pigou, The Economics of Welfare 184 (4th ed. 1948) (noting that factory emissions damage neighborhood, but discussing control devices as conferring benefit on neighborhood, presumably because factories were entitled to pollute).

57. For some reasons for this inertia, see note ——— supra. [Libecap, Noll & Krier]

58. 83 U.S. 36 (1872).

59. See, e.g. L. Tribe, American Constitutional Law 550-51 (2d ed. 1988) .

60. See, e.g. Bove v. Donner-Hanna Coke Corporation, 258 N.Y.S. 229 (App. Div. 1932) (denying nuisance claim where smoke and fumes were not out of the ordinary for the area) .

61. See section lll(a) of Clean Air Act, 42 U.S.C. sec. 7411(a) (emission standards for new stationary sources to be based on percentage reductions "achievable through application of the best technological system of continuous emission reduction."

62. One gets a sense of this expense from some of the cases, e.g. International Harvester Co. v. Ruckelshaus, 478 F.2d 615 (D.C. Cir. 1973) (concerning technology standards for motor vehicles); or Sierra Club v. Costle, 657 F.2d 298 (D.C.Cir. 1981) (concerning technology standards for new stationary pollution sources); the litigation about standards of course adds to the system costs of this control strategy.

63. Dudek & Palmisano, supra note ——, at 233 (costs savings of averaging or "netting"); cf. Hahn & Hester, Where Did All the Markets Go? An Analysis of EPA's Emissions Trading, 6 Yale J. of Regulation 109 (1989) (criticizing existing "netting" programs, though attributes part of problem to uncertainty of entitlements).

64. See generally the articles in the Law and Economics Symposium: New Directions in Environmental Policy, Colum.J. of Environmental Law 153-356 (1988).

65. See, e.g. Chevron USA, Inc., v. Natural Resources Defense Council, 467 U.S. 837 (1984) (permitting EPA's "bubble" policy for individual plants); Environmental Protection Agency Emessions Trading Policy statement; General Principles for Creation, Banking, and Use of Emission Reduction Credit, 51 Fed. Reg. 43814 (1986) (describing this and other "offset" and "banking" possibilities). NOTE TO BE ADDED RE TRADING UNDER NEW ACID RAIN PROVISIONS.

66. See Latin, Good Science, Bad Regulation, and Toxic Risk Assessment, 5 Yale J. of Reg. 89, 126-28 (1988).

67. See, e.g. Comment, Technology-Based Emission and Effluent Standards and the Achievement of Ambient Environmental Objectives, 91 Yale L. J. 792, 808-809 (notes that technology requirments are relatively easy to monitor, although thinks they does not satisfy requirements of *same* existing law, or meet overall goals of pollution control).

68. M. Sagoff, supra note ——, at 209 (1988) (environmentalist objection to tradeable pollution rights, preference for technology-based controls); see also id, at 84 (describing popular resistance to concept of pollution "rights").

69. Ophuls, supra note ———, at 153-55 (1977).

70. Ellickson, Of Coase and Cattle: Dispute Resolution Among Neighbors in Shasta County, 38 Stan.L.Rev. 623, 672-77 (1986).

71. For the historic expectation of citizens' good behavior in the management of public goods, see Rose, The Comedy of the Commons 53 U.Chi.L.Rev. 711, 745-46 (1986) (examples of expected good behavior in use of roads, waterways in nineteenth century).

72. Moose Free to Roam in their New Home, Chicago Tribune, March 26, 1985, sec. 1, at 6, col 1 (public expected to "regulate itself" and not harm animals).

73. T. Schelling, Macromotives and Microbehavior, 131 (1978 (noting that one instance of noncooperation may ruin whole in some situations, e.g. litter or a noisy lawnmower; though many ;-r.s-cooperative systems may tolerate some mix of uncooperative behavior before collapsing.

74. See, e.g. Symposium on Norms in Moral and Social Theory, Ethics 725-885 (1990),

75. This may particularly be the case insofar as people enjoy advising others, or "punishing" non-cooperators by gossip, admonition, etc. The informal "mayor" of the neighborhood street: (or even the town busybody) may play a role in norms that bears some relation to the role of the political entrepreneur, upon whom we depend for political organization. For political entrepreneurs, see text at note —— supra.

76. See note 8, supra.

77. Property as Storytelling: Perspectives from Game Theory, Narrative Theory, Feminist Theory, 2 Yale J. Law & Humanities 37 (1990).

78. See Alexander, Takings, Narratives and Power, 88 Colum.L.Rev. 1752 (1988).

79. The so-called Greenhouse Effect—global warming due to production of carbon-dioxide—is an example. See, e.g., Stevens, Earlier Harm Seen in Global Warming," New York Times, Oct. 17, 1990, at A-9, col 1 (report of international science panel, described as worst-case scenarios by one commentator) .

80. See Rose, [Storytelling], supra note ——, at 52-53.

81. For exclusionary zoning, see, e.g., McDougall, From Litigation to Legislation in Exclusionary Zoning," 22 Harv. Civil Rights-civil Liberties L. Rev., 623 (1987); for relationship to environmentalism, see, e.g. Foderaro, "Affordable Housing Issue Ruffles Idyllic Westchester," New York Times, Jan. 29, 1990, sec. 2, p. 1, col. 1 (environmental justifications for community's lack of low income housing sites).

82. NIMBY stands for "not in my back yard." See, e.g. Brion, An Essay on LULU, NIMBY and the Problem of Distributive Justice. 15 B. C. Envt'l Aff. L. Rev. 437 (1988).

83. See, e.g. Schmidt, Wisconsin Spring: New Fishing Season, Old Strife, New York Times, Apr. 8, 1990, at A-20, col 1 (Chippewa Indians' exclusive early fishing rights antagonizes sportsfishers) .

84. See International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 637 (D.C. Cir 1973) (discussing ways in which enforcement or suspension of technology standards might hurt manufacturers that had already made greatest effort). For a more recent example, see Templin, Fuel-Economy Law that Would Stymie Japanese is Sought by U.S. Auto Makers, Wall St. Journal, Dec. 5, 1989, at A-12, col 1 (discussing percent-reduction plan for automotive fuel-economy measures; would hurt Japanese auto manufacturers because their fuel economy already superior).

85. One way to lessen this difference might be to pay attention to the rhetorical aspects of Strategy 4, e.g. by dropping the term "pollution rights," in favor of something more neutral like "emission charges."

86. See, e.g. State of Ohio v. Dept. of Interior, 880 F.2d 432 (D.C cir. 1989) (valuation of natural resource damage in cleanup legislation); Anderson, Natural Resource Damages, Superfund, and the Courts, 16 B.C. Envtl. Aff. L.Rev. 405, 450-52 (1989) (same).

87. For "existence value" in natural resources evaluation, see State of Ohio v. Dept. of Interior, 880 F.2d 432 (D.C cir. 1989) (existence value one element in valuing natural resource damage).

88. See text at note ——— supra [discussion of renewal levels, e.g. of whooping cranes]

89. See, e.g. Comment, Technology-Based Emission and Effluent Standards and the Achievement of Ambient Environmental Objectives 91 Yale L.J. 792, 792-93.

90. See Rose, Rose, Property Rights, Regulatory Regimes and the **New** Takings Jurisprudence—An Evolutionary Approach, Tenn. L. Rev. (forthcoming 1990). I am speaking here largely of resources that are in principle renewable, since some resources cannot be used at all without permanent depletion; even for depleting resources, though, an appropriate regulatory regime might slow the process somewhat, to make total extraction less expensive. The classic example is oil, in which too-rapid depletion lowers the pressure levels and makes further complete extraction expensive.