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Donning Coase-coloured glasses: a property rights view of natural resource economics*

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Economic analysis of natural resource and environmental issues inappropriately places too much emphasis on Pigouvian externalities and too little on Coasean property rights and transaction costs. The crucial questions are who has what property rights and what are the transaction costs associated with these property rights. Asserting an externality implicitly assumes a set of property rights and hence a distribution of the social costs, but it is precisely a lack of property rights that allows decision makers to ignore social costs. By viewing natural resource and environmental problems through a Coasean lens, we better focus our attention on how property rights evolve, how they influence transaction costs, and how those transaction costs affect the potential for bargaining to minimise social costs.

1. Introduction

While Nobel laureate Ronald Coase's (1960) most cited article in the history of economic science should have opened all economists' eyes, and especially those of natural resource economists, to a superior way to analyse social cost, most economic analysis of the environment has not progressed much beyond Pigou (1912, 1920). Accordingly, environmental issues and natural resource misallocation are explained by a divergence between social and private costs.

At the heart of the Pigouvian approach is the deceptively simple but alarmingly complex term, externality. An externality is said to occur when parties to market transactions fail to take into account the effects of their actions on third parties who bear costs (negative externalities) for which they are not compensated or reap benefits (positive externalities) for which they do not pay. Accordingly, market transactions lead to inefficient outcomes

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with too much of a bad or too little of a good produced. The concept seems so simple and obvious that, at least early on, few even challenged the idea. Following this analysis, the policy prescription is to regulate the quantity produced, to tax transactions, to subsidise production, to have the government take over production, or some combination of all four (see, for instance, the discussion in Meade (1952) and Bator (1958)).

A few economists have challenged the notion of externalities calling instead for a Coasean focus on property rights (e.g., see Cheung 1970, 1973; Dahlman 1979; Randall 1983), but those challenges have generally not been heeded in textbooks and policy analysis. Where property rights are not clearly specified, claims of externalities implicitly assume a structure of property rights and, therefore, assume away the crux of the resource-allocation problem.

In the case of negative externalities, the implicit assumption is that the party who bears costs for which he is not compensated has a right to be free from those costs, and in the case of positive externalities that the party who provides the free ride has a right to be compensated for his production. We are inclined to say when we see smoke coming from a stack, hear loud music from a stereo, or see a hillside clearcut of its trees that these are externalities because people breathing the smoke, hearing the music, or viewing the bare hillside are bearing the costs of other people's actions. To use the term externalities amounts to asserting that the producer who emits smoke does not have a right to use the air and that the person seeing through it or breathing it does; that the music lover has no right to produce loud music and that quiet lovers have a right to be free of the music; and that the landowner has no right to clearcut his land and that the passerby has a right to view uncut forests. Each is an assertion of a property rights claim, which may or may not be well-founded in morals, customs, or laws.¹

By assuming a set of property rights, the externality approach glosses over the cause of natural resource misallocation in the first place; namely the lack of fully specified enforceable and transferable property rights. Donning Coase-coloured glasses, economists long ago should have dropped the Pigouvian externality paradigm which implicitly assumes a structure of property rights and put in its place the Coasean property rights-transaction costs paradigm which focuses on the lack of property rights as the cause of conflict. Doing so would have followed the lead of Alan Randall (1983) who recognised the imprecision and confusion caused by the term externality and called for 'more precise terminology, based on notions of nonexclusiveness and non-rivalry' (p. 145).

¹ For a discussion of the importance of morals, custom, and law in the context of externalities and environmental problems, see Randall (2000).

The purpose of the present paper is to refocus the economic analysis of environmental and natural resource issues through the Coasean lens of reciprocal costs, property rights, and transaction costs. Recognising that environmental issues are the result of competing uses for scarce resources,² I ask how a Coasean perspective changes the way we analyse conflicts over resource use and policy options used to deal with changing demands and new technologies that create these conflicts. After developing the Coasean lens, I consider the evolution of property rights resulting from changing resource demands and new technologies as that evolution relates to zoning, water use, and endangered species. These cases illustrate how ‘Coase-coloured glasses’ suggest different responses to exogenous changes in resource rents that induce property rights to evolve.³ The question becomes, as Randall (1983, p. 155) puts it: do changing resource demands and new technologies leave existing rights holders ‘maintaining their previous positions and trading to preferred positions, or will they be placed in a “pay or suffer” situation.’ In other words, do property rights evolve from existing property rights through contracting with those rights holders to reallocate rights and establish new ones or do they change through revolutionary processes that cancel existing rights and redistribute them to new individuals or groups in an effort to meet the new demands and new technologies? The concluding section suggests that the former is more likely to promote stable, predictable, and transferable property rights as a way of preventing the tragedy of the commons, while the latter creates the potential for replacing the tragedy of the commons with the tragedy of rent seeking.

2. Expunging externalities from our vocabulary

In 1960, Coase taught us that the problem of social costs was best characterised in terms of competing uses for resources for which property rights are not clear.⁴ If one person wants to use air as a disposal medium for waste and another wants to breathe that same air free of the waste, there are competing uses. If one person wants to use the air to transmit sound waves and another wants to be free of those waves, there are competing uses. If one

² Note that I specifically have chosen not to call them problems. Saying that there are environmental problems is no different than saying there are transportation problems because it is costly to transport goods from one point to another. Just as transportation costs do not imply inefficiency, nor do transaction costs imply it.

³ For other examples of the use of Coase-coloured glasses, see Anderson (1998, 2004).

⁴ For an elucidation of Coase’s point, see Yandle (1998).

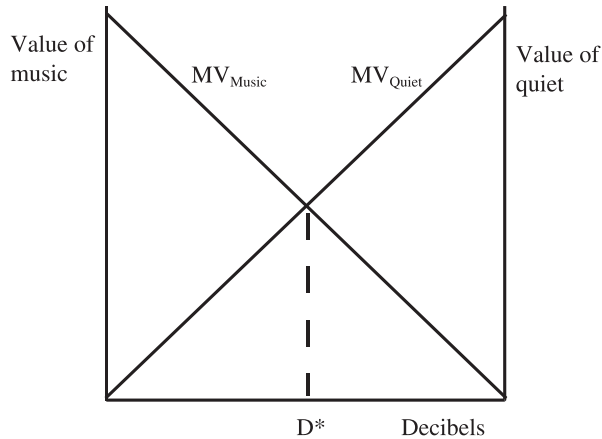


Figure 1 Optimal decibel level.

person wants to produce lumber for the market and another wants to view live trees, there are competing uses.

Coase emphasised that because one use precludes the other, the costs are reciprocal. In other words, if air is used to transmit sound waves to music lovers, there is a cost to those who love quiet, and if the air is used to produce quiet, there is a cost to those who love music. Either way there is an opportunity cost created by the competing uses.

Suppose there is an apartment building with two apartments. In one apartment lives a person who enjoys music and values louder and louder music (more decibels) at a declining marginal rate (see figure 1). In other words, additional decibels provide more value to the music lover, but the marginal value of decibels declines until it reaches zero at the maximum number of decibels that can be produced by his equipment. In the other apartment lives a person who values quiet such that fewer decibels of noise are worth more with the marginal value of quiet declining until it reaches zero with no noise.

There is an optimal level of noise at the point where the marginal value of a decibel to the music lover is just equal to the marginal value of a decibel of quiet to the quiet lover, shown in figure 1 at point D^* . The question is whether this optimal level of decibels will be achieved. The typical Pigouvian analysis would assert that there is an externality because marginal private costs are less than marginal social costs. There is a divergence because the music lover is imposing a cost on the quiet lover. But this is not how Coase taught us to think about this conflicting use of apartment space.

Consider a case where there are no rules regarding noise in the apartment building and where the quiet lover moves in first. When the music lover moves

in and turns his stereo up to full volume, the quiet lover will clearly have reduced value of quiet. He is likely to respond by knocking on the door of the music lover asserting a first possession right to be free of noise (see Lueck 2003). Assuming that he can defend this right both morally and legally⁵ and sell it, the costs are fully accounted for when the music lover compensates the quiet lover for the costs he bears or ceases producing music.

If the quiet lover cannot defend his right to quiet, there will be too much noise because the music lover is not bearing the cost of lost quiet. But, as we will discuss below, even this discussion requires considering Coasean transaction costs associated with defining and enforcing property rights relative to the value of the rights.

Now reverse the arrival of the dwellers so that the music lover is the first possessor of an apartment. When the quiet lover moves in, he might again knock on the door of the music lover and assert that a cost has been imposed on him. But in this case the music lover is likely to assert a right to play his music as loudly as he likes based on first possession. Assuming he can defend his right, the costs will again be fully accounted for when the quiet lover compensates the music lover for his reduced decibels or puts up with the music. If the quiet lover could force the music lover to reduce the volume without compensation; that is, the music lover cannot defend his rights, there will be too much quiet because the quiet lover is not bearing the cost of reduced decibels.

This example illustrates Coase's important realisation that social costs are reciprocal. If the quiet lover has the right to be free of noise, the music lover will bear the cost of scarcity, and if the music lover has the right to music, the quiet lover will bear the cost of scarcity. How the rights are assigned will affect who bears the costs and, depending on transaction costs, may affect resource allocation and certainly will affect wealth distribution. Even in the absence of property rights, reciprocal costs remain, but without property rights there is no way to say who is imposing costs on whom and no way to say there is an externality.

In the absence or presence of property rights, there are reciprocal costs, but only in the presence of property rights can we say who is imposing costs on whom. There is noise pollution if the quiet lover has the right to be free from noise or quiet pollution if the music lover has the right to music. One might claim that social norms determine the direction of the externality, but this is the equivalent of saying there is a property right.

⁵ See Randall 2000 (p. 14), where he notes that 'the term, rights, has currency both in moral discourse, where it refers to claims that have strong moral foundations, and legal discourse, where it refers to claims that are enforceable under the law'. First possession seems to have an element of both.

Saying that this is an externality diverts attention from the important issue of how property rights are determined and how they allocate reciprocal costs, which is precisely Coase's point.

In most cases where the term externality is applied, property rights are not clear. If they are not, declaring an externality is the equivalent of asserting a set of rights where they are lacking. Such assertions beg the question of how rights are formed, whether those rights can be defended, and whether they can be exchanged in voluntary transactions. These are the transaction costs that Coase focused on and that are glossed over in Pigouvian analysis.

In the example of the two apartments, there are many factors that might reduce transaction costs. First, there is the apartment building owner who, as the residual claimant, has an incentive to maximise the value of the two apartments by taking into account all costs including the scarcity value of using the air for sound wave transmission. For example, he might establish rules regarding noise levels, and these rules would maximise the value of the joint occupancy. Second, the convention of first possession is a low-cost method for determining property rights as Lueck (2003) has shown. Third, even if the apartment owner did not account for the costs, there are only two parties making it easier for them to voluntarily negotiate a set of rights.⁶ Fourth, there are technological solutions, such as noise cancellation earphones or sound proofing the walls, that the two parties might use to arrive at an optimum resolution of the conflict.

The published property rights literature has provided examples of rights to assets emerging as they become scarcer. On the western frontier of the USA, Europeans sought ways to contract with American Indians when the property rights were clear, fought with them when they were not (Anderson and McChesney 1994), and hammered out their own property rights once the rights of Indians were effectively extinguished (Anderson and Hill 1975). The first illustrates how recognition of existing rights can lead to reallocation of resources in the face of new demands; the second illustrates how high transactions costs and low costs of taking can yield the worst type of rent seeking, war; and the third shows how parties with conflicting demands can contract to establish new property rights where they are absent.⁷

Environmental assets offer a new frontier where property rights can evolve and where contractual arrangements within and between firms can

⁶ The author thanks a referee for pointing out that, to the extent the apartment is unique; that is, has location rents, there may be market power for the rights holder. In this situation, the price of music or quiet may exceed the marginal value implying monopoly misallocation (see Arrow 1971).

⁷ For a complete discussion of the evolution of property rights on the frontier, see Anderson and Hill (2004).

improve resource use, profits, and social welfare. Air, water, land, and other natural resources are used by humans to meet a multitude of demands. In the absence of some property rights to these resources, competing demands typically lead to conflict and overuse. Conflict and overuse lead to resource rents being dissipated rather than maximised. Property rights that are well defined and enforced restrict access to the commons and give the owner incentives to husband the asset; that is, maximise its rents. Determining the rights will not be costless (see Anderson and Hill 1975, 1983, 1990), but if they can be defined and enforced, bargaining can then occur taking account of the reciprocal costs. Leaping to a Pigouvian conclusion that rights cannot be specified and that bargaining will fail runs the risk of replacing the tragedy of the commons with the tragedy of rent seeking inherent in regulation and taxation. Viewing natural resource problems through the Coasean lens forces us to consider how property rights evolve and how transaction costs inherent in alternative sets of rights can encourage or discourage gains from trade.

The essential point here is that the term 'Externality is a vacuous and unhelpful term' (Randall 1993, p. 145). It adds nothing to the analysis and may even complicate the potential solution by assuming a set of property rights that does not exist. Transaction costs may increase because assertion of the externality confuses the original set of rights and distribution of costs. In essence the externality claim makes it appear that rights exist but are not enforced or that rights should be redistributed. It might be that reallocating the rights will ultimately lower transaction costs, but the reallocation itself is a form of rent seeking, the cost of which must be subtracted from any transaction cost savings.

To be sure, asserting an externality may be a useful argument for convincing others such as fellow citizens, courts, or legislatures that a set of property rights in fact exists. In other words, asserting an externality may help a person define and enforce a claim. Pejorative words such as pollution or environmental damage suggest that the person discharging effluent or altering the natural world is imposing costs on others. Again, this assumes others have a right to be free of those costs. Claims of externalities may be based on historical uses or ethical judgements about right and wrong, but they are not necessarily lodged in economic efficiency. An economist has little to say about the legitimacy of claims, but he can analyse how transaction costs determine the initial distribution of rights or how contracting costs will affect the final allocation of resources.

Coase's important point was that economists have not been careful in their analyses of environmental issues and have claimed externalities without considering the structure of property rights and how they evolve. Fortunately, because of Coase's insights, economists are equipped to consider

how different ownership regimes and transaction cost constraints evolve and how they resolve competing uses. In this era of environmentalism, it is true that people value such goods more than they did in the past (see Yandle *et al.* 2004), but this does not tell us who has what rights. Following Coase's lead, we need to carefully examine the institutions that actually determine resource allocation as he did with lighthouses (Coase 1974). Moreover, if asserting externalities runs counter to the existing rights, transaction costs may rise, conflict over competing uses may increase, and market solutions may be less likely.⁸ As Coase recognised, the costs of defining, enforcing and exchanging property rights are not necessarily low and, as a result, efficient market exchanges will not always be forthcoming. The obvious questions at this point are three: why are the transaction costs high; can they be reduced; and what should be done if the transaction costs cannot be reduced as a result of nonexclusiveness and nonrivalry? Let us consider these in the context of three examples commonly couched in terms of externalities.

3. Zoning

Land-use regulations offer a quintessential application of externality thinking to sound, smell, view, traffic, and virtually any other case where one property owner's use of resources competes with another's use. So the argument goes, when property owner A emits sound waves, produces odours, builds in the path of light, or drives on roads, he imposes costs on property owner B and does not compensate B for those costs. The solution to this externality problem often is to regulate A's land use so as to prevent A from imposing costs on B.

The Coasean lens, however, produces a very different approach to this competition for scarce resources. Certainly there are social costs resulting from competing uses, but the social costs are reciprocal. If property owner B blocks owner A from creating sound waves, emitting odours, building in the path of light, or driving on the street, property owner A is now bearing the reciprocal cost. Through this lens, the focus is not solely on whether a social cost is created by competition for scarce resources, but rather who bears this cost based on property rights. To call for a zoning regulation under the banner of externality is to assert a property right when, indeed, the conflict is the result of unclear property rights in the first place.

The question then is how do these conflicts over property rights get resolved. When small numbers of disputants are involved, the resolution itself may be a form of bargaining where the parties recognise that conflict can be negative-sum because resources are expended in the conflict. When

⁸ For a discussion of these alternatives in the context of Indian-white relations on the American frontier, see Anderson and McChesney (1994).

larger numbers are involved, some adjudication process will be necessary. This process might take place in common law courts where judges attempt to discern whether there is precedent for the property rights claims or in legislatures where interest groups vie for the political power necessary to get them their rights or prevent their rights from being taken away. Both may initially involve rent seeking, but at least the common law system relies on predictability based on precedent whereas the legislature is not so bound and, hence, is less predictable.

Yandle (1998) examined common law court rulings to illustrate how property rights are clarified and how the clarification leads to resolution of the conflicting uses. Consider his example from *Carmichael versus City of Texarkana* (4 F. 561, W.D. Ark., 1899). The Carmichaels owned a 45-acre farm in Texas on the stream that bordered Arkansas. The city of Texarkana, Arkansas, built a sewage system that collected sewage and dumped it 'immediately opposite plaintiffs' homestead, about eight feet from the state line, on the Arkansas side.' As a result of the sewage, the Carmichaels were forced to obtain domestic and stock water from another source at a cost of \$US700. Believing they were harmed by Texarkana's actions, the Carmichaels sued the city seeking damages and injunctive relief. The court found that Texarkana's

Cesspool is a great nuisance because it fouls, pollutes, corrupts, contaminates, and poisons the water of [the creek], depositing the foul and offensive matter ... in the bed of said creek on plaintiffs' land and homestead continuously ... depriving them of the use and benefits of said creek running through their land and premises in a pure and natural state as it was before the creation of said cesspool.

Though the city was operating properly under state law, the judge in the case found that this was no excuse for fouling the water and thereby violating the property rights of the Carmichaels. It is worth emphasising that the Carmichaels prevailed in 1899, long before clean water regulations were being considered at any level of government.

Whalen versus Union Bag and Paper Co. (208 NY. 1, 101 N. E. 803, 1913) shows how common law can establish Coasean property rights that can form the basis for bargaining. In this case, Mr Whalen owned and operated a farm downstream from a new pulp mill that cost \$US1m to build and that used the creek to dispose of its waste. Whalen sued the mill seeking damages and an injunction, contending that its effluent made the water unfit for agriculture, and he prevailed. An appellate court reversed the injunction based on the company's argument that the original court did not take account of the value of the mill and the 500 jobs it created. New York's highest court, however, reinstated the injunction, stating

Although the damage to the plaintiff may be slight as compared with the defendant's expense of abating the condition, that this is not a good reason for refusing an injunction. The fact that the appellant has expended a large sum of money in the construction of its plant, and that it conducts its business in a careful manner and without malice, can make no difference in its rights to the stream.

In other words, it was Whalen's clearly defined property rights that protected him from invasion and, therefore, required that the company bargain with Whalen and other riparian owners before competing with their uses of the stream. In neither of these examples do we need the term externalities; both are examples of how property rights reallocate reciprocal costs and allow bargaining once rights are clarified.

Another advantage of property rights clarification through common law courts is the process that it sets in place. In the above case it might have been that the loss to Whalen from the effluent was less than the gain to Union Bag and Paper Company and its employees from the production that created the effluent. In figure 1 that would mean the solution imposed by the court was not D^* . But this is where the Coasian approach has advantages over the Pigouvian approach. Once the rights were clarified by the New York Supreme Court, Whalen and the company could engage in bargaining that would move them toward D^* (as seen in figure 1). This process can be repeated numerous times as demand and technology change.

A Pigouvian solution starting with the presumption of an externality, however, has no room for bargaining. To correct the problem, a tax, subsidy, or regulated output is imposed by a governmental authority with the presumption that it will achieve D^* . Because the marginal valuation is unknown, so is the location of D^* . This not only requires more centralised knowledge than the Coasian solution; it also requires that the administering authority has an incentive to aim for D^* and that it will be able to revise its imposed D^* in response to changing conditions. Ample examples from the environmental arena suggest that political forces make this presumption unlikely (see Anderson 2000).

Not only do these examples illustrate the way property rights apply to the problem of social cost, they also illustrate the evolutionary nature of property rights. As long as resources such as water for domestic consumption are not scarce, there is no competition for use, and there is no reason to expend valuable time and money on defining and enforcing property rights.⁹ When resources become scarce, rents from the scarce resource are up for grabs, and the competing parties will compete for ownership. The initial

⁹ For a discussion of the evolution of property rights, see Anderson and Hill (1975).

game may be zero-sum in terms of one party's gain from establishing ownership becoming the other's loss, and negative-sum to the extent that both parties expend effort trying to influence the distribution.¹⁰ As economists we can estimate the extent of rent dissipation caused by different dispute resolutions systems (e.g., war, courts or coin tosses) and use game theory to predict whether and how a resolution might occur. For example, the tragedy of the commons is not necessarily the ultimate outcome of non-exclusiveness because clubs, community organisations, or private association user groups can provide a lower cost way of restricting entry to the commons.¹¹ Whether the evolution of property rights occurs through common law courts, voluntary associations, legislatures, or other governmental institutions, the economist's job is to compare transaction costs.

Zoning certainly could be considered one of these procedures, especially when it is done at the local level.¹² But even there, the potential exists for redistributing property rights under the guise of externalities. Consider an example in North Carolina where a new sewage treatment system allows denser development away from municipalities with centralised sewage systems (see Stradling 2004). In the absence of the new system, housing density was limited by proximity of septic tanks to neighbouring property, especially water wells. As a result of the new technology, one development went from being allowed to have only one house per five acres to being allowed nearly one per acre. Residents in the vicinity of the potentially more dense developments claimed that development is imposing costs on them in the form of noise, road congestion, air pollution, and wildlife habitat destruction. They therefore called for land-use regulations to prevent land-owners from having such dense developments that reduce their land values. A Pigouvian externality approach rationalises this restriction by assuming that the neighbours have a right to be free from the costs being imposed on them. A Coasean analysis recognises the reciprocal nature of costs, asks whether there are property rights that would allow bargaining, and analyses the transaction costs and allocation associated with the status quo rights.

It is worth considering Fischel's (2003, p. 362) conclusion regarding whether zoning is a mechanism for establishing property rights or one for redistributing them.

¹⁰ For a discussion of the negative-sum impacts of racing for property rights, see Anderson and Hill (1983).

¹¹ See Anderson and Simmons (1993) for a discussion of voluntary associations that can solve the nonexclusiveness and nonrivalry problems.

¹² For a discussion of zoning and property rights, see Fischel (2003).

'The chief problem with local zoning is that it can work too well for existing residents. By taking away development rights from owners of developable land, zoning can disenfranchise would-be members of the community. Insistence by the courts that existing homeowners respect others' right to develop land in ways deemed normal to a larger region reconciles the virtues of a decentralised republic and the institution of private property.'

4. Water allocation

Though water markets are growing around the world (see Anderson and Snyder 1997), water allocation is often contentious, and that contention increases with scarcity. In places such as the arid American desert, the main historical uses for water have been mining or agriculture. Establishing a property right to water followed a first-possession rule: the person who was first to claim water for a beneficial use has a right to that claim, which supercedes subsequent claims. This 'first in time-first in right' system required that the person wishing to establish a property right had to use the water and could not simply claim it for a future, unspecified use. In this way, diversion provided a low-cost way of signalling to others that an individual had asserted a water claim. As long as water remains to be claimed, there is no scarcity and, therefore, there are no conflicting claims. If and when water withdrawals exceed flows, prior appropriators can enforce their claims against latecomers forcing them to reduce their withdrawals until sufficient water is available to meet senior claims. Obviously, senior claims are more valuable than junior ones in this system, but if the rights are clear, exchanges can take place to reallocate water from one diversion use to another.

Defining and enforcing the rights is definitely not costless. Methods for recording and measuring water withdrawals are often less than precise. Many rights were claimed prior to a formal legal system with a courthouse where records could be filed. As scarcity has increased, however, codification of early rights has occurred, even though this codification has been costly. Metering devices can be installed at diversion points, but they are expensive and will not be installed until water becomes valuable enough to warrant the metering investment. To complicate matters, return flows are often claimed again and again by downstream users. This means that water transfers from one use to another or from one place to another that may affect return flows have to be taken into account before transactions can be consummated. If they are not, it is tempting to say that there is an externality; but it is more precise to recognise that rights are being violated. For this reason, legal systems in the American West allow return flow claimants a chance to contest exchanges that they expect will violate their rights.

Consider what all of this means for transaction costs. Recording and measuring water rights reduce the cost of exchange, but doing so requires investments. These investments are not likely to occur until the value of water is sufficiently high to warrant them. As more and more downstream claims to return flows arise, even more must be invested in quantifying diversions and consumption rights. Contested case hearings allow potentially harmed water owners a lower cost way of defending their claims when exchanges are proposed. All in all, the prior appropriation system of the American West evolved as if the players were wearing Coase-coloured glasses.

The prior appropriation system, which evolved as a way of allocating water between alternative diversion uses, mainly agricultural, has come under pressure from new demands. For instance, as growing urban demands combine with existing demands, additional withdrawals reduce the assimilative capacity of the stream and reduce water quality, and as recreational demands increase the value of instream flows, conflicts with diverters arise. How well can increasing scarcity be handled under the prior appropriation system?

Municipalities certainly have the option of buying water from agricultural water owners subject to claims of other users. Such transfers, however, have been complicated. It took Los Angeles many years to purchase water from the Owens Valley. Libecap (unpublished manuscript, 2003) points out that the bilateral monopoly nature of the exchange made it difficult to negotiate the distribution of the gains from trade. There is nothing particularly unique about such negotiating costs and nothing to suggest that there was water market failure. Another hurdle to the exchange came from third parties whose businesses were indirectly affected. For example, farm implement dealers feared that shifting water from agriculture would reduce the demand for their implements. They claimed an externality, but did they have a right for which they should be compensated? The economist cannot answer this question, but he can examine, as Libecap does, the increased transaction costs that arise if such claims can trump water exchanges.

In the case of water quality, is there an externality? Again the questions are who has what rights and what are the transaction costs associated with different rights structures. A city will bear higher treatment costs for potable water as the assimilative capacity of the stream is reduced by withdrawals. If the city has a right to a certain water quality, courts are likely to allow it to halt water transfers that reduce quality or require that it be compensated for its higher treatment costs, or both. Alternatively, if diverters have prior rights to withdrawals, efforts by a city to halt those withdrawals will be imposing costs on the existing rights holders. In this case, if the city wants cleaner water, it can either treat the water or pay diverters to reduce their withdrawals, whichever is cheaper. Negotiating with agricultural diverters

may be costly, but this is what transaction cost analysis is all about. Again there is no reason to refer to externalities; the issue is one of property rights and transaction costs.

Finally, consider the rising recreational value of water for instream flows. Is the fisher who goes to a stream and finds it dewatered experiencing an externality? Does the death of spawning salmon as a result of low flows constitute an externality? Fishers and salmon lovers might assert so, but the question is who has what rights. If the diverters with senior prior appropriation rights have the right to divert, the Coasean solution is for fishers to purchase water rights and leave them instream. The free-rider problem might raise its ugly head because of nonexclusiveness or non-rivalry, but governments are arguably formed to overcome the free-rider problem by making free riders pay through fees or taxes. Laws that allow downstream diverters to claim water not diverted make it difficult for fishers to purchase diversion rights and leave them instream. But this is a matter of the legal system raising transaction costs. In Montana, for example, the legislature changed the law so that groups or agencies can lease water for instream flows after they specify the stream reach over which they propose to assert their claim (see Anderson and Snyder 1997, pp. 121–122), and over that reach their water cannot be diverted by others. This lowered transaction costs and facilitated negotiations. In contrast, if instream flow demanders assert externalities in a world where water rights for diversion are clear, those with diversion rights will claim a taking and resist efforts to keep water instream. This is clearly the problem in the Klamath River Basin in Oregon (see Meiners and Kosnik 2003). The externality approach raises transaction costs and encourages negative-sum battles over rights while the Coasean approach focuses on the possibility for positive-sum exchanges that can be encouraged by lowering transaction costs.

5. Endangered species

Wildlife habitat generally and endangered species preservation in particular offer other examples of how Coase-coloured glasses can better focus our attention on the potential for bargaining to better meet new demands (see Anderson 1998). The issue is how are land, water, and air resources allocated to produce traditional commodities and how might they be reallocated to produce wildlife habitat. There can be little doubt that people are placing increasing value on wildlife and endangered species, but how will this demand be met?

Consider a forest that might be used as timber for lumber or paper pulp, habitat for wildlife, or some combination of the two. How the land will be used depends on the production function for the possible goods and the

relative prices of the goods. It may be that the physical constraints of the production function dictate that lumber production precludes wildlife habitat production, but it may be that the two outputs are complementary in production. If the value of wildlife habitat to the landowner is zero or negative, it will never displace lumber production when the two are substitutes. Even if habitat has no opportunity cost in terms of lumber production, zero or negative-valued wildlife habitat will only result as a by-product of lumber production. It will not be produced for its own sake.

Focus on the case of mutual exclusivity in the production of the two outputs. If the landowner cuts his trees and reduces habitat, is there an externality? Because of scarcity, there is definitely a reciprocal cost associated with cutting the timber, but again, the questions are who has what rights and what transaction costs are associated with exchanging them?

Endangered species policy has generally been pursued under the assertion that wildlife lovers have the right to species survival meaning that landowners, private or public, must preserve the habitat. At least in the USA, there is ample evidence to suggest that this assignment of rights is not easy to enforce. Landowners wanting to alter their land in ways that reduce habitat have no way of negotiating with citizens who demand habitat. Moreover, it is virtually impossible to monitor all habitat modifications, especially those that take place before land is actually inhabited by a species. If land-use regulation is more likely with an endangered species on the property, owners might eliminate habitat prior to actual habitation. On this point, Lueck and Michael (2003) asked whether the threat of endangered species regulations encouraged timber owners to harvest earlier than they otherwise might if they thought there was an increased probability that an endangered species might move onto their land. Using the number of red-cockaded woodpecker colonies within a 25-mile radius of a timber parcel considered for harvest as a proxy for the probability of habitation by the species, they found that the average age of harvest declined dramatically as the likelihood of habitation and, with it, regulation increased.

The negotiation costs for habitat alteration have been reduced through the creation of habitat credits (see Bayon 2002). If one landowner can produce habitat, he can get credit from the US Fish and Wildlife Service for having created new habitat and sell that credit to the landowner who wants to eliminate habitat elsewhere. From then on, the landowner who created the habitat is required to maintain it. Under this program, the International Paper company, one of the largest landowners in the region where these woodpeckers live, now has more colonies than there are on all of the US Forest Service lands in the region. In the Pigouvian tradition, endangered species regulations constrain land use. Habitat credits, however, give the producer of habitat a valuable property right that can be marketed.

This type of property right can reduce transaction costs and increase the incentive for landowners to produce habitat, but it first requires a redistribution of rights from the landowner to the polity. The redistribution is often in the name of reduced transaction costs or equity, or both. Again it should be emphasised that the rent-seeking costs inherent in such redistribution must be netted from the benefits of lower transaction costs.

Another example can be found with wolf reintroduction into Yellowstone National Park. When the federal government began talking about reintroduction, not surprisingly livestock owners in the vicinity were opposed fearing that their land would become habitat and their livestock would become food. To mitigate some of the opposition, Defenders of Wildlife, an environmental group, raised private money and established a trust fund from which they agreed to pay for livestock lost to wolves. In a sense, they took a share of the ownership in wolves and accepted the responsibility for wolf predation. The system still has its transaction costs associated with proving whether the livestock loss was caused by wolves and how much the livestock was worth, but in general Defenders of Wildlife has tried to keep these costs low. Because this is not truly a property right, however, there is the question of whether Defenders of Wildlife will continue to pay compensation as the wolf population expands in number and territory. But for now Coase-coloured glasses help us understand the efficacy of this approach.

The point is that simply asserting an externality when a landowner reduces wildlife habitat ignores whether the landowner has the right to reduce the habitat and ignores the incentives implicit in this assignment of rights. In many parts of the world, hunters accept that landowners have the right to alter wildlife habitat and pay them not to. Under this system of property rights, wildlife habitat becomes an asset for the landowner giving him an incentive to produce more of it. There are still costs of measuring and monitoring contracts, but they are low enough for the contracts to exist, and the contracts are becoming more prevalent as the value of wildlife increases (see Anderson and Leal 1997).

6. Conclusion

If environmental economics is to be extracted from its externality rut, it will have to be grounded on a Coasean foundation of property rights and contracting costs. Accordingly, we should expunge the concept of externality from the published environmental economics literature and replace it with property rights and transaction costs. The externality focus assumes away problems by implicitly or explicitly asserting property rights that may or may not exist and generally assumes that contracting costs prohibit enforcement and exchange of property rights.

This is not to say that property rights always exist, that they will always evolve, or that if they exist, there is never a case to be made for redefining those rights. Until resources become scarce, there is little reason for people to invest in defining and enforcing property rights. Once a resource does become scarce, competition among potential claimants may make it impossible to define the rights. And in some cases where property rights do exist, they may be deemed illegitimate and, therefore, taken away (e.g., slavery), or their configuration may make transaction costs so high that bargaining is impossible without redefinition.

That said, Coase-coloured glasses concentrate our attention on bargaining in the marketplace as a solution to conflicts over resource use. Such bargaining switches on entrepreneurship and forces decision makers to consider alternative margins for conflicting resource uses. By building environmental economics on a transaction-cost foundation that has allowed us to better understand why we have firms and how they operate to allocate scarce resources, we can better understand how to produce environmental assets. This is the same framework used by managers with respect to capital and labour markets where property rights are clear and could be more fruitfully applied to natural resource and environmental markets. By wearing Coasean glasses and focusing on the transaction costs associated with the use of environmental assets in the same way that we focus on these costs for other aspects of firm management, we economists can begin to explore the possibility of making the environment an asset rather than a liability.

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