
UNIVERSITY OF
COLORADO LAW REVIEW

Volume 86, Issue 2

2015

**PROPERTY RIGHTS IN WATER,
SPECTRUM, AND MINERALS**

RICHARD EPSTEIN*

This essay compares the system of property rights that are in use for land, water, minerals, and spectrum. Each of these systems of property rights is intended to coordinate the activities of large numbers of individuals who are unable to contract among themselves for an arrangement that secures optimal resource use. The solutions that are appropriate vary heavily with the nature of the resource involved, so that the paradigm of exclusive use associated with land fits imperfectly with both mineral rights and the spectrum, but does work well with water rights, which vary immensely with the environment in which they are found. The allocation of rights in question are important not only for resolving private disputes, but should in principle set the ground rules which govern the rules for determining when the government owes compensation for its actions that take or regulate the use of the various forms of private rights.

* The Laurence A. Tisch Professor of Law, New York University School of Law; The Peter and Kirsten Bedford Senior Fellow, The Hoover Institution; The James Parker Hall Distinguished Service Professor of Law, Emeritus and Senior Lecturer, The University of Chicago. This paper is a revised and much expanded version of the remarks that I made at the Conference on Property Rights in Spectrum, Water and Minerals held at the University of Colorado Law School on April 3, 2014. My thanks to Brian Mendick and Chelsea Plyler, NYU Law School Class of 2016, and to Rachel Bukberg and Krista Perry, University of Chicago Law School Class of 2016, for their helpful research assistance on earlier drafts of this article.

INTRODUCTION.....	390
I. EXCLUSIVITY AND COORDINATION: PRIVATE AND COMMON PROPERTY.....	392
A. <i>Creation of Water Rights</i>	393
B. <i>Riparian Rights</i>	401
C. <i>Prior Appropriation</i>	402
II. USE-IT-OR-LOSE-IT	404
A. <i>Land and Mineral Rights</i>	404
B. <i>Spectrum</i>	407
III. TAKINGS, COMPENSATION, AND DIFFERENT FORMS OF PROPERTY RIGHTS	411
A. <i>The Basic Theory of Takings, Public Use, and Just Compensation</i>	411
B. <i>The Police Power</i>	413
C. <i>Putting the Pieces Together</i>	416
1. <i>Spectrum</i>	417
2. <i>Water</i>	418
IV. PUTTING MATTERS INTO PERSPECTIVE	420
A. <i>Large Versus Small</i>	420
B. <i>Ranging Broadly</i>	422
QUESTIONS AND ANSWERS	423

INTRODUCTION

When I was a law student in the 1960s, I was taught as if the law of property included only the law of land, with an occasional nod to animals and chattels. But since that time I have made it a point to teach courses in other areas of property. These include water law, oil and gas, mineral rights, and the communications spectrum. Land still remains a sensible point of departure, for it sets a useful baseline against which the property configurations in these other areas can be best measured. The reason to start with land is that every one of these collateral fields has had to play off the land paradigm in the course of its development, though it hardly follows that these different forms of rights are all equidistant from land. It is surely the case that minerals and spectrum are closer to land; oil and gas lie a bit further away; and water law, so important in Colorado, becomes the odd man out because that system cannot possibly survive using the exclusivity of rights

that lies at the core of land law.

It is best to state my central thesis at the outset: the key point in understanding how property systems work is that the applicable legal rules are highly resource-sensitive. What that means is that different sorts of resources are best acquired and managed under legal regimes that are often different from each other in key respects. To be sure, there is no infinite granulation such that each piece of farmland or each drop of water is governed by its own unique set of property rules. But by the same token, it is important to be sensitive to the simple fact that broad categories like land and animals are often subject to important subdivisions. As one example, the rules that apply to the capture of an animal often depend on the specific characteristics of the animal that is brought into individual control. The rules that are used to capture a fox are often quite unsuitable for catching whales,¹ where the huge size of the animal requires the efforts of many individuals to succeed in the capture. A fin-back whale, (unlike some other types of whales) can rarely be captured by the parties who kill it, so the legal system developed a customary rule which allows the finder of the beached whale to collect a reasonable fee for services but not for the value of the whale. The fee has to be given to make sure that the whale is not allowed to rot when washed up onto shore. But by the same token, full ownership destroys the incentive of the whalers to kill the whale in the first place. The customary rules make these appropriate adjustments, and the full range of norms for whaling invoke different rules for different kinds of whales in order to reflect the different modes of their capture.

This short statement should give some clue as to the complexity of property rights more generally. In this lecture, I address some of the recurrent issues. In Part I, I address the trade-offs between exclusivity and coordination, which have a large part to play in deciding whether any given resource is subject to a private or common property regime. I develop the basic outlines of the legal system as it applies first to land and then to water, under both the English riparian system and the prior-appropriation system of dominant use in the American West. In Part II, I discuss the temporal dimension of some

1. *Compare* Pierson v. Post, 3 Cai. 175 (N.Y. Sup. Ct. 1805), *with* Ghen v. Rich, 8 F. 159 (D. Mass. 1881).

property regimes. Should these be infinite in duration, or should they be subject to a use-it-or-lose-it regime? In Part III, I address how the general principles of takings law apply to different forms of property rights. Finally, in Part IV, I use this quick tour of property rights systems to formulate more general lessons about how to approach legal problems of regulation.

I. EXCLUSIVITY AND COORDINATION: PRIVATE AND COMMON PROPERTY

The first question to ask in synthesizing property rights is this: Just why does anyone want to create these rights in the first place? Happily, the basic answer is extraordinarily simple: without some system of property rights, everybody will get in everybody else's way. The one given in this area is that all valuable resources are scarce. Without some system of allocation that binds the world, the result would be a melee from which everyone loses. Once the social commitment is made (even if only implicitly) to structure these rights, there are basically only two paradigms available for their organization. The first paradigm starts with the notion that each resource should have a single exclusive owner: such is the case with land. The second paradigm starts with the notion that no person should be able to reduce a given resource to private ownership, so that all resources become open access regimes that all can use but none can appropriate. Some systems of water law offer good examples of this second paradigm. Each of these basic paradigms works in fact only as an initial approximation, which in the course of its development will require corrections by litigation, legislation, or regulation. The trick is to pick the right initial point to reduce the stress on making these further adjustments.

Let us start with exclusivity. Recall in this context the dramatic overstatement of William Blackstone (who was very weak on water law):

There is nothing which so generally strikes the imagination, and engages the affections of mankind, as the right of property; or that sole and despotic dominion which one man claims and exercises over the external things of the world, in total exclusion of the right of any other individual in the universe. And yet there are very few, that will give

themselves the trouble to consider the original and foundation of this right.²

There are several points to note about this famous quotation. The first is its massive ambition. Blackstone describes property rights as binding not just the world, but the entire universe. Second, the next sentence shows that Blackstone is aware of the difficulty of creating sound foundations for these rights. As his discussion in Book II, chapter 1 continues, it is clear that he still works very much in the land paradigm of exclusive rights because he is concerned with tracing title back to an original owner through the chain of purchase. That inquiry, which leads to the adoption of the first-possession rule with land,³ does not work at all for water and has difficulties in other areas as well. But do not underestimate the power of this conception in the area of land. This strong conception of property rights allows one person as owner to exclude everyone else on the face of the globe from entering or harming his property. The correlative duties to that property right therefore require all persons to forebear from entering into that particular plot of land. The reason that this particular conception endures with respect to land is that it encourages investment today by allowing the party who sows today to reap tomorrow. We cannot expect to see that same individual investment if others are free to expropriate the fruits of that labor. It is no accident that we use agricultural metaphors because property in land becomes valuable only when it becomes possible to till the land for profit.

A. *Creation of Water Rights*

It is now instructive to contrast the regime of exclusive rights for land with the formation and organization of water rights. When the discussion shifts to water, the process is much the same, except that the discourse starts from the opposite pole of common use. The discussion starts with the commons, such that the exceptions turn out to be the cases of private use. As with many other matters, it is useful to return to the work of John Locke. In his essay *Of Property*, it is clear that Locke

2. 2 WILLIAM BLACKSTONE, COMMENTARIES *2.

3. For my views, see Richard A. Epstein, *Possession as the Root of Title*, 13 GA. L. REV. 1221 (1979).

does not grasp the full opposition between land and water.⁴ For land, he starts from a Biblical premise that all property is held by mankind in common,⁵ which is at variance with the Roman (and common law) rule that property is a *res nullius*, or a thing that is owned by no one.⁶ That initial misspecification of the right then requires him to give some explanation as to how any individual takes property out of the common, which leads him to insist that labor be added to natural resources to make them private. Locke proceeds without explaining why any actions greater than first possession should be required to establish a presumptive ownership claim. Nor does he ever explain how much labor has to be added, but his own concrete example suggests that it may be very little indeed, if all the labor needed to claim ownership of an acorn consists of picking it up. Locke puts the point thusly:

He that is nourished by the acorns he picked up under an oak, or the apples he gathered from the trees in the wood, has certainly appropriated them to himself. No body can deny but the nourishment is his. I ask then, when did they begin to be his? When he digested? Or when he eat? Or when he boiled? Or when he brought them home? Or when he picked them up? And it is plain, if the first gathering made them not his, nothing else could.⁷

But this implicit qualification of his own theory (which brings it in line with the common law rule) is the soul of good sense: Why make people work hard to acquire assets that can be obtained with little or no labor?

Locke's view of land colors his view of water rights. He notes, for example, that the way in which one obtains rights to water is to remove it from the common, just like land.⁸ But that view does not explain why it is that an individual has any right to remove water from a river or a lake in the first place. By his view, there are no independent constraints on the ability to capture, which in effect destroys water as a common resource.

4. See generally JOHN LOCKE, TWO TREATISES ON GOVERNMENT §§ 24–51 (Peter Laslett ed., Cambridge Univ. Press 1988) (1690).

5. *Id.* at § 25.

6. See G. INST. 2.1.12 (F. de Zulueta trans., 1946).

7. LOCKE, *supra* note 4, at § 27.

8. See *id.* at § 28.

The correct analysis goes in a very different direction. It starts with the assumption, especially for small English rivers, that the in-stream use of water is great. But it hardly follows from that assumption that no drop of water should ever be taken from a river for private uses. The question is: How much water can be taken? The correct answer, in theory at least, is one that means that, on average, the last drop of water in private hands is exactly equal in value to the last drop of water that is left within the river. It is an effort to create an equivalence between private and public uses at the margin.

What do we mean by that particular phrase? Well, every time someone takes a drop of water from a river, there's one drop less for prior public uses and one drop more for private uses. For the initial amounts of water taken from the river, it can be said that these are what keep people from drowning, starving, or dying of thirst. If so, take those amounts out, because they are not going to do much harm to the river, but they will provide a lot of private good for individual users. However, as private parties keep drawing more water from the river, sooner or later, the in-stream losses will exceed the out-of-stream gains. This judgment is not accurately captured by the term "wasted" because waste only covers the case where the use to which the water is dedicated has *no value* at all. In-stream versus out-of-stream uses is not an explicit comparison, and it is far harder to make. Indeed, stated in its literal form, the constraint against waste is too weak because it cannot prohibit any use whose value is greater than zero, no matter what the value of the alternative uses.

Locke then compounds his first error with a second, when he says that the key question is whether the party who appropriates the water "leaves as much again and as good in the common" for others to take.⁹ Literally construed, the constraint is too strong because, so long as there is any scarcity, there is not as much left in the common as before. But clearly it makes no sense to say that no one can take any water from a river because to so insist results in the loss of substantial social gains. Measuring those gains is very difficult, and the task is compounded by the need to decide which parties are entitled to use what fraction of water for what purposes.

The question then is how best to systematize the difference

9. *See id.*

between rights in land and in water. As is often the case, this inquiry begins with Roman law, which provides the origin of the term “usufructuary interest” that plays such a large role in water-law cases. Let us start with the original meaning in Roman law: literally, a usufruct gave someone the right to use land (*usus*) and to collect the fruits (*fructus*) of the land. As a first approximation, the ancient usufruct was an inalienable life estate in possession over a particular parcel of land.¹⁰ Suppose I own a piece of land and I have either a relative or a partner in business who can presently make better use of it than I can. What I can do is transfer the usufruct to them, often gratuitously. The basic rule lets them use it as they please, so long as they do not damage “the bare proprietary,” or what we would call reversionary interest. But, at the same time, the usufructuary is not allowed to sell that interest off to anybody unless they get my consent.

The basic intuition behind the inalienability rule is that, whenever there are divided interests in property, the transfer of the possessory interest to a third party could have negative effects on the holder of the future interest. There is a risk that the friendly party-in-possession will be replaced by someone who does not have the interest of the reversioner at heart, perhaps due to a lack of affective ties between the parties. Unlike the English life estate, you cannot create a usufructuary interest in remainder, i.e., after the present usufructuary dies, because that additional interest does not serve any good. Allowing multiple life estates in remainder just adds additional confusion to the title in an age when security in conveyancing is hard to come by. Thus, the Roman solution to this issue may well be superior to the Anglo-American law that allows a long succession of life estates in remainder, all of uncertain value.

So the question now arises: given this account of a usufruct, why would anyone use that term to describe an interest in water in either a riparian, reasonable user, or prior-appropriation system? The answer is that we do not have a better home-grown word to deal with partial interests in a larger whole. The basic argument runs as follows: any evaluation of the relative efficiency of different legal systems

10. For a basic account, see BARRY NICHOLAS, AN INTRODUCTION TO ROMAN LAW 144–47 (1962).

should not spend too much time on the hard cases. It is important first to get the easy cases right. So, as a young torts teacher, I knew that different consequences arose from the choice between negligence and strict liability. But I quickly discovered that, while these differences mattered in the few disputes that came to litigation, the key point was exactly the opposite. In most cases, including the early product liability cases,¹¹ the two rules lead to the same place. Thus, it is hard to attach major weight to a choice between two rules that lead to the same result about ninety-nine percent of the time. Practicing lawyers have to master the differences for hard cases. But system-wide, the choice between these rules had few if any grand social consequences. It is not as though the value of neighboring plots of land will dramatically change if the theory of nuisance law shifts from negligence to strict liability or the reverse. The key cases of major pollution will be caught either way. Hence, any change in a legal rule from strict liability to negligence or the reverse will have little if any impact on land values. So it becomes hard to choose the right rule when the possible choices mirror each other so closely over the broad run of cases. It is only on tricky appellate cases that the doctrinal differences between these two liability theories start to manifest themselves. Accordingly, it becomes an overwrought enterprise to identify which rule is superior to the other and why that choice looms large, if it generates only a one percent system-wide difference in social welfare.

Yet, big questions can produce big differences, at least once they are identified. Let me give you an illustration. Let us start with the choice of rules for land and water, before we address the choices among water-law regimes. First, consider the thought experiment in which the land law system is used for water and vice versa. Not so brilliant! To the skeptic or legal realist, we can flip these over: everyone “knows” that private-property systems are arbitrary such that efficiency does not come into the picture. What really counts is one’s intuitive sense of justice. But the differences are so profound that this

11. See *Escola v. Coca Cola Bottling Co.*, 150 P.2d 436 (Cal. 1944). The initial choice between strict liability versus negligence with *res ipsa loquitur* had no financial implications. The expansion of the definition of “defect” to include open and obvious conditions had huge implications, even though the new cases were typically decided under negligence principles. See RICHARD A. EPSTEIN, *MODERN PRODUCTS LIABILITY LAW* 25–48 (1980).

switch will never take place. For choice of rules with respect to land, it turns out that, under any system that allows everyone equal access to every parcel of land, agricultural production will plummet with disastrous consequences. If the party who plants is not allowed to reap, society will revert back to hunter-gatherer communities in which nothing gets planted at all. It is no accident that judges and lawyers alike understood, with Blackstone, that long-term, exclusive interests in land are essential for its development. Historically, there was no permanent interest in property until there was agriculture because nobody cared to make any kind of investment in it. Adam Smith figured that out by just being a smart guy.¹² Subsequent works by evolutionary psychologists and anthropologists have confirmed that no one makes permanent investments in land in a hunter-gatherer society.¹³

Standard ownership concepts apply to chattels and to animals, but for land it is the short-term possession (akin to the usufruct) that prevails as clans and families glide through land in hunter-gatherer societies.¹⁴ Once the fruits of a given location have been exhausted, it is time for the tribe to move on anyhow. Societies like this face multiple tensions when fresh land is sufficient to support one group but not two. The shortage of resources can easily lead to violence over the control of a territory, as there is no independent system of title that can establish priority among rival tribes. At this point, the choice of property rules really matters. Because agriculture requires extensive clearing of land with an eye to future return, the older versions of weak property rights in land have to yield

12. See generally ADAM SMITH, LECTURES ON JURISPRUDENCE (Ronald L. Meek et al. eds., 1978).

13. See, e.g., Thomas Mayor, *Hunter-Gatherers: The Original Libertarians*, 16(4) INDEP. REV. 485, 487 (2012). Mayor states:

Although hunter-gatherers have individual rights to personal property, no property rights typically exist in the natural resources the band uses. With very few people and abundant natural resources, creating property rights in those resources yields no advantage. This common-property condition probably prevailed with few exceptions until the development of agriculture some ten thousand years ago.

Id. (emphasis in original).

14. See Carol M. Rose, *Possession as the Origin of Property*, 52 U. CHI. L. REV. 73, 87 (1985) (“At least some Indians professed bewilderment at the concept of owning the land. Indeed they prided themselves on not marking the land but rather on moving lightly through it, living with the land and with its creatures as members of the same family rather than as strangers who visited only to conquer the objects of nature.”).

to the newer concept: civilization will literally collapse unless strong property rights are accepted in an agricultural economy. In this context, the rule of first possession lays the groundwork whereby one person (or more commonly one tribe) can exclude all others. That system works, imperfectly to be sure, because the defensive position has the edge when the insiders and outsiders are of equal strength. There is a peculiar interpretation of the meaning “might makes right” in this context. The stability of possession depends on the insider’s advantage, because it means that tribes of rough equality can enter into peaceful coexistence so long as their power remains roughly equal. Property rights are a big deal.

But can this system of exclusive rights work with water? It often depends on the form in which water is found in the state of nature. Let there be a small river located exclusively in large holdings in Northern Scotland, and the exclusive rights paradigm will work. There is only one player that has access to that river, and he has neither upstream nor downstream neighbors. By all means, keep the river exclusive along with the land in which it is embedded. But property rights in water are always sensitive to conditions of scale. Once the river becomes longer, and its nearby land becomes more fertile, the scales for land and water no longer match. It is no longer conceivable to create large landholdings so that rivers that run tens of miles are within a single territory. At this point, shared ownership regimes become a physical necessity. And the same is true with the vast rivers in the western United States, including of course the mighty Colorado. Once again, the choice of legal rules really matters.

In this context, the effort to make a wholesale transfer of the legal rules for land to the legal rules for water is an invitation to disaster. To allow a first possession rule to apply to water would mean that anyone who dams a river can keep all the water for himself. The river dies and, with its death, all natural wildlife, scenic beauty, prospects for navigation, and recreation end up at the bottom of a barrel. Empirically sensitive calipers are not needed to show that this system is inefficient, thanks to the immense destruction of riparian value for upstream and downstream owners alike, and to the public at large. A simple rule of first possession is a poor fit for a complex resource like water that has, in different locations, a wide but variable range of in-stream uses and out-of-stream

uses. Diversion, which is the water-law equivalent of first possession, is therefore transformed from the ultimate good into the prime wrong of a water-law system.¹⁵ A strong private-property regime based on exclusive possession invites a social catastrophe of the first order.

This lesson is of exceptional importance to good libertarians who take Blackstone on property seriously. When I taught my first water-law class in the fall of 2013, there were mainly libertarians in the room. One of them, Benjamin Fischer (who not coincidentally will clerk for my former student, Justice Allison Eid, on the Colorado Supreme Court in 2014–2015) exclaimed in frustration one day: “Professor Epstein, why have you ruined our comfortable libertarian view of the world by turning everything upside down?” I responded that it is difficult to construct a single set of property entitlements applicable to all kinds of diverse resources. At some point, intuitions have to be tested against experience in order to develop a more comprehensive theory. It is simply a question of trying to figure out a system that balances two kinds of costs—externalities and coordination—which are always in tension with each other.¹⁶ Reduce the number of parties within the ownership system, and the number of externalities increases. Increase the number of parties within the governance structure, and the coordination problems increase. In principle, it should always be possible to get to the ideal middle point no matter which extreme you start from. But in practice, it is generally easier to start in each separate property rights system at that pole which is closer to the anticipated final position. So, exclusivity is not the right starting point with water just as common ownership is not the right starting point with land. At this point, it becomes useful to look at how these visions play out with different versions of water rights. I start with the riparian system and then move onto prior appropriation.

15. See, e.g., *Stratton v. Mount Hermon Boys' Sch.*, 103 N.E. 87 (Mass. 1913) (holding that diversion of water for use on a nonriparian tract is per se illegal). But see RESTATEMENT (SECOND) OF TORTS § 850A (1979) (purporting to relax that rule somewhat). State courts continue to follow the common law rule. See generally CRAIG ADLER & NOAH HALL, *MODERN WATER LAW: PRIVATE PROPERTY, PUBLIC RIGHTS AND ENVIRONMENTAL PROTECTION* 23–85 (2013).

16. For further discussion, see Richard A. Epstein, *On the Optimal Mix of Common and Private Property*, 11 SOC. PHIL. & POL'Y 17 (1994).

B. Riparian Rights

In practice, the common law system relied on four principles to delineate a system of property rights.¹⁷ First, water riparians may not reduce water levels to the point where they jeopardize the going-concern value of a river for fishing, navigation, and recreation. Imposing this constraint offers a rough-and-ready way to determine the total amount of water that can be removed from a river or lake. Second, a system of pro rata uses for all riparians is a rough-and-ready way to create parity among the various users so that no one gets an undue share relative to others. There is no prior-in-time rule applicable that gives any preference to earlier riparians—the polar opposite of the land cases. People arrive at the river at all different times, and there is no reason to incentivize rapid consumption of water as a way of protecting entitlements. As more users come into the system, all existing users must make pro rata cuts. Accordingly, in densely populated areas, there are not likely to be too many late arrivals, so that the system works tolerably well with manageable difficulty. Third, in allocating water uses, the law prioritizes private uses, so that domestic uses take precedence over agricultural ones within this proration system. It is again a set of crude proxies for relative values, which tend to be right on average but often wrong, and unavoidably wrong, in particular cases. Fourth, the law does not allow anyone to transfer water rights independent of the sale of the appurtenant land. By analogy, with the inalienable usufruct in land, transfer raises a real risk that the transferee will make more intensive use of the water when it is untethered from the land, to the detriment of other riparians. In order to keep the river in its integral state, you have certain inefficiencies associated with the alienation of these rights, which can now be transferred only with the land in question.

How does the law come to these accommodations? The answer is not very clear, and most of these rules are created by judges who—for the most part—are worried about moving too far in one direction or the other. The institutional checks are weak, but within this setting have worked tolerably well. This

17. For an earlier discussion, see Richard A. Epstein, *Why Restrain Alienation?*, 85 COLUM. L. REV. 970 (1985). For a discussion on the pressures that build up on the system when use intensifies, see Mason Gaffney, *Economic Aspects of Water Resource Policy*, 28 AM. J. ECON. & SOC. 131, 137–41 (1969).

system is far from perfect. There are serious measurement problems and a noted unwillingness to compare the relative efficiency that different riparians make of their respective allocations. But it is all a lot better than random. It is equally clear that the uncorrected Lockean approach that does not explicitly take into account the difference between rights in water and land can never get itself to the right conclusion.

C. *Prior Appropriation*

The overall analysis does not get any easier with prior-appropriation systems, under which the earlier appropriators take precedence over the later ones. In these settings, in-stream values are generally low relative to the private consumptive uses. Here, the Lockean prohibition against waste does have an echo in the prior-appropriation rules that provide that water can only be taken for beneficial use,¹⁸ which offers at most a first cut in constraining excessive water use. But as before, beneficial use is only a minimum condition that does not guarantee that all water is put to its highest-value use, as happens to items that can be separately allocated by bid. Nonetheless, the law is rightly committed to a system that rejects the riparian view that all riparians share equally in the river regardless of the time at which they came to the river. The topography of western lands and rivers drives the result. It would not be very smart to encourage a riparian to bring his cows to the edge of the Grand Canyon in order for them to sip water out of the Colorado River 5,000 feet below.

There is a fundamental need to invest in long-term improvements in the form of ditches and other equipment. Predictably, therefore, the legal system switches over to prior appropriation in an epic case called *Coffin v. Left Hand Ditch Company*,¹⁹ which offers one of the starkest efficiency justifications for junking the riparian system before anyone knew what the word “riparian” meant. What was at stake was a competition between two claimants to the water in an arid western region of the United States, one of whom relied on riparian rights and the other on prior appropriation.²⁰ The suit

18. See, e.g., *Empire Lodge Homeowner's Ass'n v. Moyer*, 39 P.3d 1139, 1146–47 (Colo. 2001).

19. 6 Colo. 443 (1882).

20. *Id.* at 446.

was precipitated when the riparian ripped out a portion of the dam that had been constructed by the prior appropriator on the St. Vrain creek.²¹ The decision by Judge Helm gave scant protection to vested riparian rights and twice stressed the “imperative necessity” for using a water-law system that fit the locale.²² The judge wrote as if he were what we commonly call today an aggregate utilitarian, which is one who pays little attention to the distributional consequences of his decision. That is normally a very dangerous practice because it leads to the instability of property rights. But when the net gain is so large, and the complexities of working out a compensation system among thousands of winners and losers so vast, that approach actually makes good sense. The productivity of tens of thousands of acres of land would be lost if the makers of ditches and canals could not obtain secure sources of water. The system of priorities gives a signal to parties as to how much they should invest and why.

Again, this system is not perfect, but prior appropriation is a vast improvement over the riparian system—a legal transition that meets the requirements of the so-called Kaldor-Hicks standard, whereby an action is deemed efficient if the gains to the winners are so large that they could support a fund to pay full compensation to the losers.²³ No one should rely on this standard if the best estimate of gains is twenty and that of losses is nineteen. The system is too prone to error. But, in this case, the differences are by orders of magnitude, so it is better to allow the transformation without compensation. *Coffin* does not read like a public choice gambit by one organized group against the public at large. The overall size of the gains means that it is no longer necessary to discipline the judicial or legislative process by a compensation requirement. Even small riparians can share in the overall gains of a far more efficient system. Perhaps there will be hard cases in the middle, but those can be resolved when and if they arise. The important point is closeness of fit to the resource in question. Neither riparianism nor prior appropriation is ideal. But it would be a true disaster if the systems were reversed such that Colorado

21. *Id.* at 444.

22. *Id.* at 447.

23. See John R. Hicks, *The Foundations of Welfare Economics*, 49 *ECON. J.* 696, 711–12 (1939); Nicholas Kaldor, *Welfare Propositions of Economics and Interpersonal Comparisons of Utility*, 49 *ECON. J.* 549, 551 (1939).

were a riparian state and England used prior-appropriation rules.

II. USE-IT-OR-LOSE-IT

A. *Land and Mineral Rights*

The basic discussion of property rights not only involves questions of how these rights are acquired. It also raises questions as to how long those rights can be retained if their current holder does not use them. This issue can arise in connection with prior-appropriation systems in water, which allow for the loss of priorities that are not consistently asserted—although in practice these rights are usually asserted, given the constant need for irrigation.²⁴ The issue of forfeiture for nonuse is often trickier in connection with minerals, where the initial decision to mine often requires a large capital investment that might be best postponed for years. In dealing with various mineral claims, agreements often contain provisions that require one party to use some particular right or otherwise forfeit. In dealing with this principle, the initial point to note is that it is one thing to impose these terms as a matter of contract between the parties, but it is quite another thing to think that they should be imposed on owners as a matter of positive law. To see these risks, consider what would happen if the traditional first possession rule for the acquisition of land were replaced as a matter of positive law by the “use-it-or-lose-it” principle that sometimes attaches to more limited rights, such as mineral leases. As a matter of first principle, it would be a serious mistake to say that a title in land, once vested, is lost unless it is used within a certain time. In general, there is every incentive to develop land, but little reason as a matter of positive law to impose on individuals a duty to develop land once acquired. The content of that duty has to first be defined and then enforced by some outside agency. Occasionally, governments float proposals that individuals should be required to sell land against their will if they are laggard in their development. Schemes of this sort were made in Scotland

24. See, e.g., *State ex rel. Reynolds v. S. Springs Co.*, 452 P.2d 478, 482–83 (N.M. 1969) (questionably finding forfeiture even when withdrawals were not economically feasible).

in the run-up to its failed independence vote, which is why the once-hot Edinburgh land market cooled off, as investors waited on the sidelines to see if such legislative schemes would pass.²⁵

The doctrinal reason to shy away from a duty to develop is that the initial possession of land gives that first possessor the fee simple absolute in possession—that is, makes him sole owner of the land for an infinite duration. The practical case against a time-limited duty to develop is that a person who gets the gains from investments today or tomorrow is normally in the best position to make the temporal judgments needed to decide whether to invest now or invest later, to harvest now or harvest later. At this point, it is hard to see why the rest of the world would be adversely impacted by any decision that the owner makes to maximize his or her own resources. There is no obvious source of conflict with outsiders over any decision of the owner either to hasten development or delay it. Generally, the owner who maximizes his own value creates positive externalities for others, so it is best to spare the administrative expense and confusion that comes with some ad hoc qualification of the traditional fee simple interest.

More specifically, the decision on timing of investment has to take into account two risks, one of which is commonly appreciated and the other of which is often overlooked. The easily observed risk is that some property owners will sit on a resource of great value when it turns out that development is desired. The other risk, less noticed but equally important, is that the owner will engage in premature development of a particular resource that is better left untapped—an outcome that is often socially undesirable for ecological reasons. These corner solutions—either total exclusivity, or total common access—do not exhaust all possibilities because it is always possible, and indeed common and usually desirable, for owners to adopt a mixed strategy that makes less intensive use of an asset today in order to make more intensive use tomorrow. Crop rotation is one common example. Over the long haul, the patterns may involve farming in the short term with major plans to improve or expand the physical plant down the road.

Given these endless permutations, the correct approach

25. See Merryn Somerset Webb, *The Twilight of Private Ownership in Scotland?*, FIN. TIMES, Aug. 1, 2014, <http://www.ft.com/cms/s/2/c7c0e662-133a-11e4-8244-00144feabdc0.html#axzz3CwoaPEaX>, archived at <http://perma.cc/XJL3-87U7>.

starts with understanding the complex tradeoff between these two risks. On matters of delicate balance, the initial question is whether some external party or the property owner is better able to choose the correct temporal strategy. In my view, the use-it-or-lose-it strategy that may be appropriate for mineral rights should *not* carry over where there are multiple paths for asset use. It is important to identify how the choice of rule depends on the particular context.

Surely, use-it-or-lose-it is inappropriate for water cases, and it may be unwise with spectrum as well. To impose that rule will only encourage individuals to make use of a scarce resource lest they lose the right to use it in the future. Not allowing a party to draw water from a stream under a riparian regime leaves more water in the river for others. Under a prior-appropriation scheme, the issue is somewhat more complicated because constant nonuse could be construed as abandonment of the resource in question. As to the spectrum, nonuse does not prejudice others, but it does cost the owner income, so that the condition is not likely to persist. In contrast, in the leasehold context, the issue is never what the positive law tells a particular owner to do; it is what the landlord, pursuant to contract, tells a particular tenant to do. A landlord might find it perfectly appropriate to put a use-it-or-lose-it condition in a lease because he knows that any royalty stream dwindles from nonuse. The tenant who does not use the resource gets all of the benefit from nonuse, while the landlord is put at a systematic disadvantage by suffering the loss of all royalties. The use-it-or-lose-it clause is one way, albeit an imperfect one, to address that conflict of interest.

The point can be generalized. Any time parties create split interests by contract, they have necessarily built in externalities between the two parties along one or more margins. The actions of one could compromise the value of the interest of the other. The great achievement of most voluntary contracts going back to the Roman law of usufructs allows the two parties, by contract or by grant, to coordinate their behavior to deal with the opportunism that necessarily arises from split ownership. The initial division takes place because there are gains from trade between the parties. But the downside of that division is the prospect of abuse once the deal is in place. Since this risk is known in advance, parties are in a position *ex ante* to take precautions that minimize that risk,

not only for the parties to the transaction, but also for their successors in title, by way of assignment or descent.

A second complication with use-it-or-lose-it by contract concerns how the practice operates with two different kinds of landlords. One is the private owner and one is the government. The private owner will likely have the right kind of incentives, but no mortal can easily grasp the complex incentives of government agents in deciding whether, and if so how, to lease property—whether for minerals, or for oil and gas, or for everything else. The difficulty comes from trying to figure out the objectives of the government, which is never a unified, profit-making enterprise. Predicting the behavior patterns gives rise to a public-choice nightmare of the first order because of all the clashing interests that will bear down on the government's choice.

One famous illustration of this problem arises when the Audubon Society decides to lease property for oil and gas leases.²⁶ It wants to collect the royalty revenues, but needs to preserve its habitat. What it says to its lessees is that it will take a smaller royalty because it wants the tenant to take greater precautions against leakage and other damage. It is a perfectly efficient solution, but the incentives change on public lands where the Society does not hold the landlord's interest. The Society takes a hard-line position against drilling on public lands, which now becomes a desecration of natural resources. The configuration of ownership rights really matters in dealing with organizational incentives.

B. Spectrum

The problems with use-it-or-lose-it also apply to the other kinds of resources, including the spectrum. Optimal rights in the spectrum edge closer to land because exclusive rights over use offer a strong first approximation of the most efficient system. Therefore, whether we have grants or licenses—the difference turns out to be crucial²⁷—somebody is now entitled

26. See John Baden & Richard Stroup, *Saving the Wilderness*, REASON, May 1981, at 28, 28.

27. For discussion, see Ronald H. Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1 (1959); Thomas W. Hazlett, *The Rationality of U.S. Regulation of the Broadcast Spectrum*, 33 J.L. & ECON. 133 (1990). For my views, see Richard A. Epstein, *Possession and Licenses: The FCC, Weak Spectrum Rights and the LightSquared Debacle*, in LAW AND ECONOMICS OF POSSESSION (Yun-

to the exclusive use of some portion of the spectrum for a given period of time, ranging from three years out to infinity. If the law creates only short-term interests in the spectrum, it works as an open invitation to the same kind of transitional difficulties that arise by thinking that the first possessor of land only obtains an interest that lasts for a limited term of years. In contrast to the standard landlord-tenant situation, there's absolutely no gain whatsoever for letting the government retain a reversionary interest over any or all of the spectrum. The retained interest does nothing to improve short-term performance. But it does create huge problems as the time for the expiration of the term of years comes closer. Should there be renewal? If so, on what terms? And if not, how does the lessee of the spectrum plan its investment strategy?

Let me disagree with Joan Marsh in her talk,²⁸ when she argued that one advantage of use-it-or-lose-it is that it forces anyone who is sitting on a valuable asset to either develop it or sell it in the secondary market to someone who will develop it. There is no reason to use coercion to achieve a transfer of ownership. If AT&T wants to retain spectrum for future use, for example, it can do so. But in order to take that path, it has to be prepared to forgo any income that is offered to it by an outsider. The company will not do that if the cash is worth more than the reservation of rights for future use. In all likelihood, it might search for a way to lease the asset to someone else until it is ready to use that spectrum itself. A similar practice often happens on new-growth timberland, which is used for recreation until ready for harvesting. In reality, therefore, the basic point cuts in the opposite direction. If in fact it is not optimal for somebody to keep the spectrum idle, the outsider can nudge that party out of its stupor by paying it money or making some other more complex transaction. So long as bargaining costs are low, the initial allocation should not stand in the path of the optimal use of that scarce resource in yet another application of the ubiquitous Coase Theorem.²⁹

Chien Chang ed.) (forthcoming Dec. 2015).

28. See Joan Marsh, Vice President, Fed. Regulatory Affairs, AT&T, Panelist at the Univ. of Colo. Silicon Flatirons Ctr. Conference on Prop. Rights in Spectrum, Water, and Minerals (Apr. 3, 2014), available at <https://www.youtube.com/watch?v=5IFVj1U6TNw>, archived at <http://perma.cc/X3M2-9UTP>.

29. See Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).

I also would add that, wholly apart from the temporal dimension, spectrum use is very complicated given the possibilities of leasing that I referred to above. Political forces completely corrupt the sound operation of the property rights system in the spectrum. One illustration of the complexities here involves the ongoing LightSquared litigation, on which I have worked as a consultant for Harbinger Capital, long the dominant shareholder in LightSquared.³⁰ The core of that dispute was whether the Federal Communications Commission (FCC) should have pulled the LightSquared licenses for the use of two large spectrum bands on the ground that the Global Positioning Systems “listened in” to their transmitters on the LightSquared spectrum.³¹ The FCC thought that this “interference” warranted suspending LightSquared’s new project, even after it had negotiated key milestones that required LightSquared to make major expenditures. The administrative decision did not, however, require the Global Positioning System (GPS) users to pay LightSquared a single dime, let alone the opportunity cost for the lost spectrum that is now blocked off. This weak system of property rights has resulted in massive social losses, which could have been avoided if the FCC had announced that the GPS companies could use the spectrum, but only so long as they paid the appropriate rental value, at which point they would have reconfigured their own system to reduce the payments owed to LightSquared.

The abandonment of any system with clear property rights thus substitutes in a complex set of administrative maneuvers for a direct comparison of the value of the disputed asset to rival users. The social losses are in the end enormous, and include: the loss in spectrum uses; the loss of LightSquared’s two-billion-dollar investment in its own build-out; the massive litigation costs that the dispute has spawned and continues to spawn; and the major losses to third-party contractors with LightSquared, who could not recover their own investments once the initial license was suspended. Government control

30. For extensive commentary, see Epstein, *supra* note 27. For a summary of the various developments, see Thomas W. Hazlett & Brent Skorup, *Tragedy of the Regulatory Commons: LightSquared and the Missing Spectrum Rights*, 13 DUKE L. & TECH. REV. 1 (2014).

31. See *LightSquared Inc. v. Deere & Co.*, No. 13 Civ. 8157(RMB), 2014 WL 345270 (S.D.N.Y. Jan. 31, 2014). For my account, see Epstein, *supra* note 27.

thus introduces a massive amount of administrative intrigue and political uncertainty, which in this instance has blocked—perhaps forever—the deployment of a third network on the scale of Verizon or AT&T. Indeed, the overall situation gets only worse. Once the FCC pulled LightSquared’s license, further successful legislative efforts by the GPS companies (aided by the heavy clout of the Department of Defense) made it impossible for the FCC to reverse its decision, without first going through time-consuming and costly administrative hearings.³² It is ultimately possible that the FCC could be held liable for its breach of contract with Harbinger or that the GPS companies could be found responsible for a physical taking of the LightSquared spectrum that they use. But those *ex post* remedies are far less effective than a sound system of property and administrative law that avoids these problems in the first instance.

In light of this and other difficulties, it is clear that much could have been gained if the law had followed Ronald Coase’s 1959 article on the FCC,³³ which advocated the sale of existing spectrum band to the highest bidder—ruling out the risk of license suspension or cancellation. Under a property rights system, it is possible to limit interference with existing frequencies. Determining the allowable levels of interference is never all that clear-cut because, under any system of entitlements, some interference has to be allowed because the intensity of an emission fades as it moves further from its assigned frequency. But no matter what the decay rate, some low-level physical interference is always present between any two frequencies.

The technical challenge is to figure out just how much interference the law should tolerate at the boundary line, but that question of out-of-band emissions is far removed from the out-of-band reception (OOBR), whereby one frequency user claims the right to listen in over the adjacent frequency. I am not aware of any authority on interference that accepts the GPS companies’ claim that a party is in the wrong when it

32. See National Defense Authorization Act for Fiscal Year 2012, Pub. L. No. 112-81, 2015 Stat. 1298, 1534 (2011) (providing that the ban continues until all the interference issues are addressed, and then only after all interested parties have a chance to comment on its report). No party would support these delays if it had to pay interim rent.

33. See Coase, *supra* note 27.

wants to use its own spectrum that has been colonized by an outsider. In an odd sense, the GPS companies' claim falls within the use-it-or-lose-it class, given that the GPS companies' claim was plausible only because the LightSquared spectrum had not been gainfully employed when the GPS companies first listened over it. One consequence of use-it-or-lose-it, therefore, is to flip the property rights over, so that the owner is now barred from its use by the actions of outsiders. The object lesson should be clear. The traditional view of property rights with strong boundaries and infinite durations outperforms any ad hoc system that uses in its stead indefinite boundary conditions and short-term rights of government termination. The insecurity of title in both the physical and temporal dimensions causes serious resource misallocations.

III. TAKINGS, COMPENSATION, AND DIFFERENT FORMS OF PROPERTY RIGHTS

Use-it-or-lose-it is not the only rule whose application can vary with context. Of far greater importance in the grand scheme of things is the general law of takings, which has developed a massive structure from a single clause in the Fifth Amendment: "nor shall private property be taken for public use, without just compensation."³⁴ As is the case in virtually all areas of law, any serious dispute over property rights raises a large set of questions under the Takings Clause. In this Part, I first outline the integration of three key building blocks of this branch of law, which include an analysis of the notions of takings, public use, and just compensation. Next, I discuss the unstated portion of the eminent domain quartet—the ubiquitous police power—which is nowhere found in the Takings Clause, but which necessarily limits its scope and application. In the third section, I indicate how the various pieces fit together, especially with spectrum and water.

A. *The Basic Theory of Takings, Public Use, and Just Compensation*

The major office of the Takings Clause is to find a middle

34. U.S. CONST. amend. V. For my detailed analysis, see RICHARD A. EPSTEIN, TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN (1985).

path between two unacceptable extremes. The first is that the government can only take property with the consent of the individual owner. In competitive markets where goods and services are routinely for sale, the government never resorts to its takings power because the goods and services it needs can be acquired voluntarily from a whole host of private suppliers at a far lower cost. But with land in particular, it is common to find situational monopolies, which give the owner a serious holdout advantage in any negotiation with the state. These holdouts often arise with respect to strategically placed installations, like forts and roads, which are even more difficult to deal with in the acquisition of rights of way over private property. The construction of new roads could be routinely blocked if each of a large number of owners could holdout for a fraction of the anticipated gain from the project. Indeed, it is likely that the sum of these demands would far exceed the social value of the intended public use. Given these evident coordination questions, consent therefore imposes an impossible hurdle to the creation of these needed public goods.

The opposite extreme is every bit as unacceptable: let the government take the property for no compensation at all, so long as it is for some defensible public purpose. The obvious objection to this position is that it tolerates takings of property that provide an ounce of public benefit at the cost of a pound of private inconvenience, as political majorities could impose massive burdens on unpopular individuals or groups. So if consent leads to too few takings, the power to take without compensation leads to far too many.

It is at this point that the combination of public use and just compensation comes into its own. The first requirement is intended to remove from the political agenda takings for private purposes only. The governor cannot order the state to condemn his neighbor's land even at market prices so that he can extend the reach of his private gardens. The Just Compensation Clause, which applies to takings that are for public use, simultaneously overcomes both the holdout and the expropriation problem by requiring just compensation for the property taken. In essence, if the state cannot raise the funds to execute the taking by taxation, the property is likely to be worth far more if left in private hands. But if it can, then the public gets the benefit of the gains, while the individual property owner is not wiped out in the process. In either case,

the just compensation filter tends to move property into public hands only when it can be put to a higher value use. There is good reason then why this structure has proved so durable. It is important to note that this framework, if accepted, makes it clear that the supposed distinction between takings and regulations is unacceptable because this overall analysis applies to *all forms* of private property, not just land. And in principle it ought to apply to anything that counts as a taking of property, including the taking of partial interests in land, such as easements and servitudes. The political dynamics relating to holdouts and confiscation are constant across different forms of property and across different types of government regulation, so that ideally the same framework applies constantly across all these areas.³⁵ Accordingly, as should become clear, this analysis undermines the supposed constitutional distinction between outright takings and regulatory takings, where the latter refers to laws that limit rights of use and disposition, but leave the owner in possession of the land or other asset.

B. The Police Power

The tripartite analysis set out above has to be qualified to take into account the pervasive role of the police power in the overall analysis.³⁶ That power has generally been defined as the power to regulate *without compensation* private behavior that threatens the health, safety, morals, or general welfare of the population. Stated in that form, it looks as though the police power can swamp the system of private rights just outlined. But the police power should in all cases be construed to be congruent with the basic system. Under this view, the very kinds of actions by one person that (typically) give neighbors the right to either damages or an injunction against particular conduct also give the state the parallel right as their agent to fine or enjoin that same conduct. The interposition of the state therefore allows for the more efficient enforcement of private rights, but does not allow for the expansion of rights

35. See Richard A. Epstein, *The Spurious Constitutional Distinction Between Takings and Regulation*, 11 ENGAGE 11, 11–12 (2010).

36. For the classic account, see ERNST FREUND, *THE POLICE POWER: PUBLIC POLICY AND CONSTITUTIONAL RIGHTS* (1904) (discussing the proper limitations on the constitutional rights of liberty and property).

that are vested in government hands. Thus, all neighbors are entitled to damages and injunctions against ordinary nuisances, and so the government can fine and punish individuals for widespread pollution. Yet, at the other end of the spectrum, no one can enjoin the construction of an ordinary house on his neighbor's land without just compensation. The state is in the same position and cannot invoke its police power to prevent these activities. Instead, it must use its takings power, which means that it must first satisfy both the public use and just compensation portions of the Takings Clause.

At this juncture, the entire success or failure of the global takings analysis depends on the ability to work out a coherent theory of the common law tort of nuisance, which is no easy task. Nuisances come in all sizes, shapes, and quantities. The proper starting point is a large nuisance from one party that causes substantial harm to another. But note the parallel to the law of trespass where any entry, however small, onto the land of another is a *prima facie* case of trespass. Now try to extend that view so that a nuisance consists of any physical invasion by filth, noise, odors, and the like coming from one person's land onto the land of another in the absence of a direct entrance onto another's property by the creator of the nuisance. The usual definition of nuisance tries to fudge the point by insisting that only substantial invasions count as nuisances.³⁷ The point makes eminently good practical sense because by the broader definition that I gave above, every time I whisper in the garden at night, I create a nuisance by noise to any neighbor who hears it. To be sure, if that noise were loud, an injunction would be appropriate to shut that behavior down.

Nonetheless, the law of nuisance has to be sensitive to matters of scale, lest it become far too severe in its application. Hence the standard legal response has been to develop a rule of live-and-let-live with respect to these minor infractions. The great judge who figured this out was Baron George Bramwell, a libertarian, who adopted the rule in 1862 in *Bamford v. Turnley*,³⁸ which relaxed the notion that every physical

37. See *Morgan v. High Penn Oil Co.*, 77 S.E.2d 682, 689 (N.C. 1953) (“[A]ny substantial non-trespassory invasion of another's interest in the private use and enjoyment of land by any type of liability forming conduct is a private nuisance.”).

38. 122 E.R. 27, 33 (Ex. 1862). For my explication of the principle, see Richard A. Epstein, *Nuisance Law: Corrective Justice and Its Utilitarian Constraints*, 8 J. LEGAL STUD. 49, 74–90 (1979).

invasion, regardless of how small or widespread, should constitute an actionable nuisance. He said, quite simply, that live-and-let-live is the better outcome for all concerned if it is put into place from what is now called the *ex ante* perspective, which means that everybody will regard himself as better off with that modification of rights than with any original system of rights that carried over the hard boundary rules from trespass to nuisance.³⁹ Indeed, it was soon recognized that if any given landowner had many neighbors, it would be impossible to achieve this relaxation of the boundary condition by an elaborate and costly set of voluntary contracts and covenants.⁴⁰

In the end, the live-and-let-live approach is a prime example of a forced exchange of rights that is so beneficial that it becomes part of the settled expectations about property rights, so much so that the dominance of this rule means that no one in practice thinks twice about its routine operation. With respect to land, the lesson is that the law always makes corrections against hard boundary lines when their rigorous enforcement leads to inefficiencies that leave all persons worse off. So, to give a familiar example, historically the *ad coelum* rule—that the ownership of land extends to the outer limits of the universe—was absolutely wonderful, because there was no rival interest that required curtailment of the vertical interest in land. But in the age of airplanes, no one thinks that everyone would be better off if each and every airline had to acquire hundreds or thousands of licenses from landowners, each of whom has a right to exclude airplanes that are flying hundreds or thousands of feet above ground. So, the law announced that the upper spaces are now free spaces for airlines to use, without needing permission from the landowners below.⁴¹ But by the same token, it will hardly do to have the upper airspace an unregulated commons with planes crashing into each other. Instead, the Federal Aviation Administration fills the void by creating the rules of the road that allow airlines to fly without crashing into each other, which is a manifest social improvement over a world without any rules regulating air traffic.

39. *Bamford*, 122 E.R. at 33.

40. *Corp. of Birmingham v. Allen*, 6 Ch. D. 284 (1877) (Jessel, M.R.).

41. *See, e.g., Swetland v. Curtiss Airports Corp.*, 41 F.2d 929, 942 (N.D. Ohio 1930) (entitling plaintiffs to fly five hundred feet above defendant's land).

C. Putting the Pieces Together

It is important to see how the pieces fit together. In those cases where the law forces a single person to bear huge losses by the actions of another, cash compensation is appropriate to redress the balance *ex post*. But if the benefits and burdens created by a new statute or a new common law rule are uniformly distributed across the population, it becomes unwise to waste everyone's time and money by collecting tax dollars from everyone that are then paid out to the same people from whom they were initially collected. The entire enterprise of taxation and payment should be scrapped when it produces no gain. Indeed, as a matter of legal principle, all changes in property and liability rules count as *prima facie* takings. That broad definition of takings is in turn offset by a broad definition of *implicit in kind compensation*, which can be found in some, but by no means all, of the cases in which the government has taken property.⁴²

So, once again the choice of theoretical approach really matters. Use a narrow definition of taking, such as one that restricts taking to government dispossession of land, and the question of compensation never arises, so that any examination of government action for its negative effects is over before it starts. But take the broader definition of taking and implicit-in-kind compensation has to be *proven*, not just presumed. That compensation can be found in the cases of high overflight, which causes no direct losses to surface owners but generates large social gains from improved transportation in which everyone shares. But the same cannot be said of low overflights needed in landing and taking off, where vibrations and noise can cause immense damage to surface structures that should be compensated.⁴³ The dangers are only multiplied with so-called regulatory takings, where the government leaves parties in possession of land, but strips them of common law rights of use and disposition, often imposing unique burdens that go utterly uncompensated under the tests for compensation that Justice William Brennan announced in *Penn Central*

42. Epstein, *supra* note 27, at 258.

43. Compare *United States v. Causby*, 328 U.S. 256 (1946) (allowing compensation for direct overflights), with *Batten v. United States*, 306 F.2d 580 (9th Cir. 1962) (wrongly denying compensation for vibration damage in the absence of direct overflights).

Transportation Co. v. City of New York.⁴⁴ It is often said that exclusivity is the decisive feature of property rights in land.⁴⁵ However, the system of property rights is not encapsulated in a single dimension but rather covers all the features—use, development, and disposition—that lend value to property in the first place.

Let us now turn to the application of this principle in various concrete applications.

1. Spectrum

A glaring omission in dealing with the spectrum is the refusal to address the role of takings and just compensation as a constraint on government conduct. As an example, we can start with the spectrum use at issue in the *LightSquared* case. The takings argument runs as follows in this context: it may well be that the GPS group has powerful needs for the spectrum in question. If so, then let the government condemn that fraction of the spectrum in ways that require the GPS group to pay just compensation for that spectrum use on a periodic basis equal to its market value in the hands of *LightSquared*. At this point, the price mechanism forces an honest revelation of preferences. If the GPS users think that they can derive enough gain from the use of the spectrum to be better off even after they have compensated *LightSquared* for the lost value, so be it. They can take and pay. But note that the cash payment will induce the GPS group to see if they can cut down on use in ways that reduce the cash payments they have to make by reducing their OOB. Thus, if it costs one billion dollars per year to rent the spectrum, and only one-hundred million per year to reconfigure the scuppers used for reception so that it is no longer necessary to list out of band, just that result would happen without any direct state order. Therefore, the GPS group would no longer seek to stall any resolution of this problem, given their interim financial obligations. The posturing that takes place under the current regime without property right protection would no longer make

44. 438 U.S. 104, 124–25 (1978). Note that Justice Brennan derived these rules in part from water-law cases that denied compensation for loss of a tailwater needed for operation of a power head. See *United States v. Willow River Power Co.*, 324 U.S. 499 (1945).

45. See *Kaiser Aetna v. United States*, 444 U.S. 164, 170 (1979).

any sense, for it is clear that the GPS users would never pay LightSquared the value it gets from the use of its spectrum. The price system not only offers compensation *ex post*, but more importantly, it stops economically unwise transactions from happening in the first place.

2. Water

The role of eminent domain is of equal importance with respect to water rights, where once again it is critical that the government obey the basic rules of the game that apply to everyone else. One water case that illustrates the need for this approach is *Mildenberger v. United States*,⁴⁶ which involves the question of whether the government has to take responsibility for its pollution of downstream waters. In *Mildenberger*, Congress authorized an extensive project on the Okeechobee Waterway, which had the effect of diluting the salt content in water that in turn led to widespread death in downstream oyster beds, culminating in the decline of other forms of marine life, including crabs, sponges, fish, and birds.⁴⁷ The individual claimants in this case sought extensive damages from the government for pouring large quantities of fresh water into the river.⁴⁸ They also sought damages for the harm to their riparian interests, after the runoff from Lake Okeechobee carried many nutrients from agricultural activity, which damaged the ecosystem. There is no question that if any private party had permitted either of these practices, its conduct would have been regarded as tortious based on the simple principle that pollution of downstream waters by upstream actors is actionable whether the allocation of water is done on riparian or prior-appropriation principles.⁴⁹ The law covers cases in which pollution turns a fresh-water stream into a salt-water stream.⁵⁰ Without it, the war cry against pollution

46. 643 F.3d 938, 941 (Fed. Cir. 2011).

47. *Id.* at 943.

48. *Id.*

49. *See, e.g.*, *Missouri v. Illinois*, 180 U.S. 208, 248 (1901) (dealing with claims of pollution in Missouri from sewage stemming from the reversal in direction of the Chicago river); *Missouri v. Illinois*, 200 U.S. 496, 526 (1906) (rejecting the earlier claim on causation grounds).

50. *See, e.g.*, *Strobel v. Kerr Salt Co.*, 58 N.E. 142 (N.Y. 1900) (allowing nuisance actions to downstream victims of pollution in a riparian system); *Arizona Copper Co. v. Gillespie*, 230 U.S. 46, 57 (1913) (enjoining pollution in a prior-appropriation system).

would be heard everywhere.

Yet note this strange role reversal when the government wears the black hat. When the government admits that it pollutes, you get a judge in the federal court, Judge Arthur J. Gajarsa, announcing that everybody knows that the rights of riparians do not include the right to not have your water fouled from pollution coming from above.⁵¹ He claims that the plaintiffs failed to identify any cases recognizing “their compensable interest in having the water adjacent to their properties free of pollution.”⁵² As noted, the case law in private disputes takes a very different view of pollution, so the question is: why does the insertion of the government into the role of polluter flip the entitlements over? That approach is flatly wrong in a riparian system, flatly wrong in a reasonable-use system, and flatly wrong in a prior-appropriation system. The basic wrong of pollution is key to all traditional forms of property rights. *Mildenberger*, therefore, was a case where the court should have invoked the Takings Clause to supplement and strengthen the basic system of private rights. It is worth noting the collateral benefits from this alternative decision to other parties with riparian interests who are not joined in the lawsuit.

Now suppose that it turns out that the pollution is valuable. In the *Mildenberger* situation, the government can force the exchange so long as it pays full compensation for losses, at which point the costs of its action are on its own budget. As with the spectrum, the financial incentive is likely to lead to a quick reconsideration of basic practices, and a cessation of all or most of the pollution in question. Once again, the Takings Clause introduces a price system that forces the government to make an honest estimation of the value of its own interests, which it never has to do when the law offers private parties no protection. The valuation difficulties are never sufficient to block all legal relief in cases where one private party pollutes the land or water of another, or in which one private party pollutes the land or property of the government. They are equally tractable when the government acts as the polluter.

The basic point is that in setting the proper mixture of

51. *Mildenberger*, 643 F.3d at 948–49.

52. *Id.* at 949.

private and public rights, it is unwise to fear payment because it will force the government to put various costs on its budget, which, like most private parties, it may be loathe to do. Instead, it is critical to treat that decision as a positive virtue precisely because on-budget decisions will allow courts to avert tragedies like *Mildenberger* and *LightSquared*.

IV. PUTTING MATTERS INTO PERSPECTIVE

The specific issues that I have touched upon cover a wide range of subjects and, in closing, it is important to extract from the discussion several themes that help link these various materials together. In this instance, I think that two such themes are worth discussing. The first has to do with a question of subjective evaluation: how does one distinguish between a large structural issue and a smaller issue of implementation that may be more difficult but less important? The second question is one of methodology: how is it best to study the system of property rights in particular, and social institutions more broadly?

A. *Large Versus Small*

These spectrum and water cases make it clear that, in dealing with the transformation of property systems, relative magnitudes are critical to any overall evaluation of alternative arrangements. They also tell us that these parameters are often best understood by people with years of experience within any given system, so that these experts can estimate aggregate consequences without the rigorous empirical studies that people always want but can never get. What holds for water also holds for minerals, oil and gas, and spectrum—all of which require some good estimate of the empirical magnitudes of the relevant trade-offs. The danger of being an academic is becoming insensitive to small variations in rules that can in practice have large social consequences. The explanation is this: academic lawyers start with appellate cases and pay insufficient attention to the routine transactions, by which everyone will either live or die. Most disputes that reach the courts are not like *Coffin*; rather, they tend to deal with questions that are close on the merits, where the prospects of

success are about even.⁵³ These cases do not, therefore, alter the fundamental operational features of the system. Indeed, one point I constantly stress in dealing with cases is to worry less about the difficulty of the issue and more about the total in-dollar equivalents that will change hands in the aggregate if it goes one way or the other.

So, what follows from these observations? In these three particular property areas, there are small- and large-sized problems. The first task is to identify the correct relative magnitudes, then leave the small issues to the lawyers to work out through the usual appellate process. But for large issues, it is often necessary to introduce comprehensive institutional arrangements that cannot be created without an institutional infrastructure in order to handle these questions. There is no way that a court can organize the monitoring rules for a system of prior appropriation in water, the unitization rules for oil and gas production, or the assignment of frequencies for spectrum. But this institutional commitment requires that these administrative agencies be attentive to the importance of their task and not behave as if they were free of all legal constraints.

Just that kind of breakdown in government responsibility took place in the *LightSquared* situation, when the FCC adopted the definition of interference championed by the GPS companies. The conclusion that a property holder does not have the right to exclude others from his property has, if generalized, the makings of a social catastrophe of the worst order. It would allow, for example, an outsider to stop all construction on land owned by another person if it interfered with television signals over the owner's property, even if a better antenna, installed at their own expense, would obviate the problem. The key point here is that once the basic structural decisions are made, they have to be respected. The wholesale reversal of property rights in *LightSquared* does nothing of the sort. A serious discussion as to the appropriate signal-to-noise ratio in assigning frequency is a necessary technical task that imposes no similar threat.

53. See George Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 15 (1984).

B. Ranging Broadly

The final lesson with which I will end this discussion is the importance of studying widely, even if you do not know the intimate details of the various systems under discussion. That wider approach gives a broad world perspective in which the same kinds of structural issues recur in different areas that, at first blush, do not seem to be all that related to each other. In this context, the ultimate inquiry can be put in one ugly sentence: can you monetize the difference in the change of legal structures from one to the other? Everyone involved with the law has to think about that question very carefully. If it is impossible to figure out how to monetize a given problem, it tends to be sorted out as a grand political issue. But if some good estimates on monetization can be made, they would give information as to the appropriate trade-offs, which in turn would improve the chances of selecting the optimal rule.

Here then is the basic approach. If a contract solution can resolve the problem between all relevant parties, embrace it. But property rights, of course, bind the world and are needed precisely because no private contract can set the initial distribution of rights on which voluntary contracts can then operate. So if exclusive rights are needed for development, as with land, spectrum, and minerals, the traditional system of property rights, which requires mutual and universal forbearance from entry, starts to look attractive.

Now recall that, in dealing with oil and gas, that solution does not work well because oil and gas, unlike hard minerals, are fugacious—i.e., the stuff tends to move around underground. That one characteristic now makes all the difference in drilling on private lands, because the well that goes straight down can still siphon off other people's oil and gas. What goes for one goes for all, so that an unregulated system of well placement produces too many wells and too little oil and gas. To combat that problem you need, again, a legislative solution, which the participants embrace when use levels become high enough to cause serious shortages and disruptions for all the disparate users of the common resource. It was for this reason that, in the first part of the twentieth century, state after state turned to well-spacing systems, pooling systems, and unitization systems to combat the very risk of over drilling that became manifest under a property

regime that limited itself to a prohibition against slant drilling.⁵⁴ The legislation reduced costs and improved output.⁵⁵ The same question arises with respect to the fishery, which is subject to common pool exhaustion. If the law chooses to use the wrong system to handle the common pool problem, it can reduce output by 50 to 90 percent.⁵⁶ So the big institutional design questions are what I want to leave you with. The great feature about this particular conference is that it gave you a very nice opportunity to see how this particular dynamic played out across all of these areas.

I will cede it back to the common pool and allocate it to that person who asks a question first, so thank you all.

QUESTIONS AND ANSWERS

Question 1:

Professor Epstein thanks for being here. You mentioned at the beginning an issue that maybe wasn't touched on in the panels as much as you thought was necessary: the use-it-or-lose-it regime encouraging overdevelopment or fast development of particular resources when maybe it's necessary to sit on those for a while. I'm wondering what you think about that issue with the recent boom in unconventional oil and gas development in Colorado?

Answer 1:

The fracking issue, right? Let's start from the beginning. Use-it-or-lose-it is an efficient contractual device when there are divided interests because otherwise the conflicts of interest really take over. The question with fracking is: do you or do you not see those interests? You certainly don't see them with respect to the land leases. The dispute over fracking is a very different question, which is: if you intensify the process, what

54. Richard A. Epstein, *The Modern Uses of Ancient Law*, 48 S.C. L. REV. 243, 255 (1997).

55. For some sense of the complexity of the rules and practices, see *Unitization (Exploratory and Secondary)*, BUREAU OF LAND MGMT., DEPT OF INTERIOR, http://www.blm.gov/mt/st/en/prog/energy/oil_and_gas/reservoir_management/unitization.html (last updated Oct. 27, 2014), *archived at* <http://perma.cc/B4GN-9BYG>.

56. R. Quentin Grafton, Dale Squires & Kevin J. Fox, *Private Property and Economic Efficiency: A Study of a Common-Pool Resource*, 43 J.L. & ECON. 679, 709 (2000).

does it do with respect to externalities of a nuisance-like behavior? My view on nuisance law is pretty much the same as it was in the twelfth century: physical invasion of somebody else's water supply, even when done by private parties, ought to be actionable. Then the question is: what is the choice of remedy? In nuisance law, that becomes the central question.

The first choice on systems of social control is this: do you go *ex ante* or do you go *ex post*? There's a divided answer to it. You do not go, at least with fracking in my judgment, *ex ante* where you stop it in its entirety. The better course is to follow the common law rule on this topic, which allows any neighbor to get an injunction as of right against fracking if there is an imminent threat or some actual harm, until the danger is eliminated. The reason for this "no mercy" rule is that smart owners will always steer away from the abyss by backing off a little bit from the boundary, so the probability of this particular occurrence would be small.

The least desirable permit system starts by imagining a thousand different things that could possibly go wrong. The law then requires the applicant to explain in detail how best to respond to each and every one of these remote possibilities in advance of their occurrence. Since talk is cheap, it is easy for multiple groups of objectors (Boulder is not a bad place to have it) to generate hundreds of reasons to prohibit some activity *ex ante*. The winning tactic, unfortunately, is to magnify extremely low probability events into make-it-or-break-it requirements for permit approval. Not good.

So, the first problem deals with *ex ante* regulation. The second problem deals with the *ex post* remedies. If the *ex ante* approach doesn't stop particular losses, then the law should supply serious damage remedies based upon the actual and consequential losses associated with those operations. In a complex regulatory system, it is usually unwise to have only one arrow in your quiver.

The third feature to understand is the most important. It's the dynamic nature of innovation. That is, if you go to the early days of fracking, the number of mishaps was rather substantial, often because of plain dumb practices, sometimes even with best practices. Recall that these are industries whose technologies evolve extremely quickly. One of the reasons why you don't want to impose the ban is that it prevents beneficial adaptations created by constant use. So, as with nuclear power,

the United States hasn't done anything serious since 1977, but the French (of all people, the French!) are running fifty-nine nuclear power plants without a hitch, which are used to meet all of their power needs for electricity generation. Theirs is the technology that you want to copy. You don't want to keep old nuclear plants in business; you want to get them out by putting new ones in. In fact, the greatest and single most expensive word in the environmental lexicon is the word "new." Today our environmental laws put very heavy taxes on new developments, which then grandfather and protect older developments that are vastly less efficient. The ratio of the pollution rates between the best and the worst could be enormous, perhaps one or two orders of magnitude. These gratuitous regulatory losses are simply unforgivable. You don't want to give people an excuse to keep a bad plant in service, but that is what is done when the inability to get new plants online leads to the retention of an existing plant with higher danger levels. The better institutional design calls for an output tax on pollution, which, when consistently applied, means that the old plants will be retired. When the new plants come online in numbers, major improvements in safety and output will follow.

So the chief challenge is a question of remedial design to deal with the externality problem. You're not talking about the problem of either indefinite property rights over time or the question of how you form an optimal lease.

Question 2:

Whenever we're thinking about property rights frontiers, which is the case with land (like the Arctic), spectrum, and minerals, there's going to be a race for property rights. You mostly talked about property rights in a comparative context and you didn't discuss a lot of the trade-offs in terms of gains for prospecting, in terms of dissipation, too many oil wells and so on, in the race for property rights on frontiers. Could you discuss that a little bit?

Answer 2:

This is an absolutely vital question. Let's go back to the non-frontier case, then we'll turn to the Sooners. The first possession rule does not come ready-made from Heaven. It's a rule that comes from serious thinkers who developed it at a

time when the diffusion of people to the unoccupied frontier took place at a very slow rate. It was also the case historically that if you sought to possess too much property, you couldn't protect it from the animals, let alone rivals. If you took too much property, you were too far from your neighbors with whom you could enter into reciprocal arrangements of defense and support. The upshot is that natural limitations on efficient plot size in an agricultural setting led to a regime in which people tended to acquire moderate sized, squarish plots of land. Only much later would the discussion turn to infrastructure and roads. The system worked pretty well to achieve its modest goals of separation and cooperation.

When the context shifts, however, nothing guarantees a stable outcome. Recall who the Oklahoma Sooners were: they were located in that state not too far from here. What happened is that the legal authorities decided to implement a first-possession rule that would allow people to recover 160 acres of land, so they had a distributional constraint. But the artificial conditions created an unmanageable land rush in 1889. The Sooners were the people who cheated on the process by jumping too soon in order to get a leg up in the search for the best lands. The result was a near melee because about 50,000 people started out from a common border at about the same time. Remember that even though the first-possession rule is expressed in *ordinal* fashion, the *cardinality* (i.e., the size of the actual differences) makes a huge institutional difference. So, in that setting, an auction by the state of pre-assigned plots, open for inspection before bidding, is the correct way to allocate these parcels.

Turning to the spectrum, it is the Sooner problem writ large. Clever parties could, if allowed to do so, occupy the whole spectrum in a matter of a second or less. To use a first possession rule in that context is bizarre and wasteful. As with the Sooners, the initial function is for the government to demarcate the relevant property rights in blocks, which have the following two characteristics: they have to be wide enough to be useable, yet not so wide as to create huge monopoly impediments. So, in a Goldilocks world, the challenge is to make the soup just right: not too hot and not too cold. Once the law gets the basic structure right, it has solved the big problem. The small problem is trying to figure out exactly how to configure these bands: how wide and why? At that point, the

government should listen to industry people and technical experts to make sure that narrow bands do not result in excessive interference between neighbors. So initial bands in the midrange seem desirable. A second key problem for bidding is whether individual bidders can bid on multiple bands in order to create spectrum adjacencies that boost overall outcome, subject again to an antitrust constraint.

So again recall that each clear rule results from a conscious trade-off of alternative imperfections. The law can go too fast, or it can go too slow. If it doesn't develop the right institutional texture, it will never sort out individual cases correctly. As you may know, when the government sought to work out these conflicts in connection with broadcast radio in 1926, it reached the worst of all possible accommodations. They dedicated too small a spectrum band to broadcast use, whose use was subject to excessive constraints unrelated to the interference question. Note again the timing. In 1920, spectrum control by occupation worked well because it was the dawn of radio. Within a short time, however, technological improvements drove conflicts, which led Herbert Hoover, as an all-too-energetic Secretary of Commerce, to make top-down allocations—not by bid, but by deciding in comparative hearings which applicant best served the public interest. The Supreme Court unwisely ratified this decision some fifteen years later.⁵⁷ The potential use of auctions died until Ronald Coase managed to revive it in 1959,⁵⁸ following on Leo Herzel, who had taken a similar position in his 1951 student note.⁵⁹ These are cosmic errors, just errors beyond all compare, and the best modern commentator on this is Tom Hazlett who, on multiple occasions, has exposed the serious economic losses from top-down government management.⁶⁰ It's not like one of these really exquisite balancing cases where you can write soberly.

57. See *Nat'l Broad. Corp. v. United States*, 319 U.S. 190, 227 (1943).

58. See Coase, *supra* note 27.

59. See Leo Herzel, "Public Interest" and the Market in Color Television Regulation, 18 U. CHI. L. REV. 802 (1951).

60. See, e.g., Thomas W. Hazlett, *Spectrum Flash Dance: Eli Noam's Proposal for "Open Access" to Radio Waves*, 41 J.L. & ECON. 805 (1998).

Question 3:

The desire to avoid speculative profits: how does that fit into your system?

Answer 3:

The answer starts with this retort: what's the problem with speculative profits? The fact is that the exact same problem arises with respect to theater tickets. By pricing the ticket too low for season subscribers, do we want to say they can only give it to their distant mother-in-law or sell it to a total stranger for at most twice the price? If your purpose is to figure out the sum of revealed preferences for a given item in short supply, the speculator acts as a responsible middle-man to shift assets from a lower- to higher-value use.

The only risk is that a speculator could "corner" a market in order to gain monopoly profits. Success at that activity requires, however, at the very least some regulatory barriers that prevent the orderly market from emerging through the entry of new players. Generally speaking, if there's a well-organized market on the back end to deal with resale, the speculator ceases to be a problem. Remember the public outrage over oil spikes. In the end, no one could find any oil industry manipulation that drove the process. It cannot be a suitable theory that holds that markets fail when prices go up but that markets succeed when prices go down. So the answer to speculation is usually a nice snooze.

The other alternative to stable markets comes from the predation model. I could construct an elaborate theory that one time in a million might show how predation can work, but this issue just isn't a serious systemic problem. The serious problem in antitrust law is collusion. If you treat predation and collusion as equal antitrust violations under section one,⁶¹ it conflates procompetitive with anticompetitive actions. To be sure, there are hard cases of vertical integration that require some trade-off between the efficiencies and the restrictive practices, where the former are generally greater than the latter. There is also the risk of a cat's-paw operation where the vertical party coordinates a horizontal cartel among downstream users. But that scheme is also hard to pull off. In some rare cases, vertical integration presents major

61. Sherman Act, 15 U.S.C. §§ 1-7 (1890).

2015]

PROPERTY RIGHTS

429

monopolization issues, but that is not the first priority in running an antitrust division, which should begin with the horizontal arrangements. Microsoft's one-time dominance in the server market is perhaps one example where monopoly power was possible. But erosion through competition would have been far better than the antitrust suits, which have managed to sap the innovative spirit of that company. On predation, generally worry not.

So, with speculation and predation, I'm signing off.