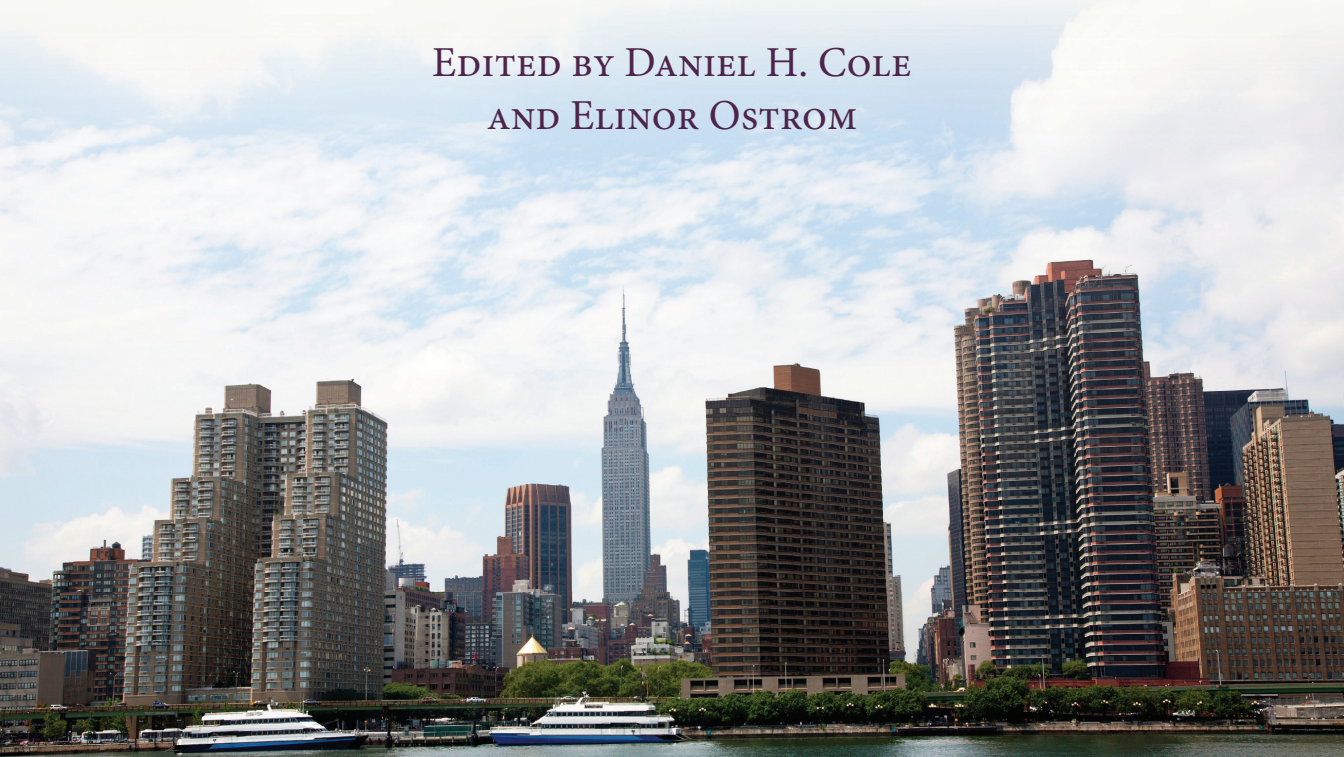
Property in Land and Other Resources

Edited by Daniel H. Cole
and Elinor Ostrom



Foreword by Douglass C. North

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Property Creation by Regulation

Rights to Clean Air and Rights to Pollute

DANIEL H. COLE

Government regulations impose on private property rights, as libertarian scholars remind us (Claeys 2003; DeAlessi 1980; Ely 1998; Epstein 1985). At the same time, they also protect property rights by controlling negative externalities created by neighbors (Karkkainen 1994). Indeed, in many cases, the same regulations that restrict property also protect it (much as common-law nuisance liability protects and limits property at the same time).[1] Zoning laws (or subdivision regulations) may limit my right to develop my property as I see fit, for example, by prohibiting gas stations from my neighborhood; but that same regulation also protects my property by similarly restricting my neighbors. Less well understood and appreciated is the fact that government regulations can actually create property rights—private, public, and/or common—in resources where property relations previously did not exist or were underdetermined.[2]

This chapter, which elaborates on some ideas sketched in Cole (2002), examines regulatory tools governments have used to convert the atmosphere from a nonproperty, open-access resource into public property and, to a more limited extent, private property. The purpose is not to argue normatively that regulatory creation of property is preferable to other methods by which property rights are established (under either positive or natural-law theories),[3] but merely to establish that regulation

[1] Zoning may or may not be a particularly efficient means of limiting and/or protecting property rights. A sizeable literature exists on that issue (Ellickson 1973; Fischel 1978; 1980; 1987; Maser, Riker, and Rosett 1977), but it is not relevant to the thesis of this chapter.

[2] Throughout this chapter, the phrase "property rights" is used as Cole and Ostrom define it in the introduction to this volume. The term "right" is meant in its strict Hohfeldian sense as a correlative of "duty." To say that one person or group possesses a "right" to some asset or resource, at least one other person must possess a corresponding duty to avoid interfering with the right holder's lawful use of that asset or resource. The term "property" is a purely descriptive appendage to "right" that distinguishes rights in things (including incorporeal things) from "personal rights," "human rights," and so on. Other scholars define "property rights" differently, of course. Merrill and Smith (2001), for example, define "property rights" in a way that requires the word "property" to do more work. They distinguish between property rights and contract rights, for example, because property rights are *in rem* (that is, in the thing itself) and supposedly apply against the entire world (a legal conceit if ever there was one), whereas contract rights apply only to the parties to the contract. Merrill and Smith's definition reflects a venerable juridical view of property rights that arguably has grown obsolete as property rights have become increasingly malleable, thanks to instruments such as trusts, and have been attenuated by various kinds of regulations, easements, servitudes, and other interests.

[3] This chapter also does not attempt to distinguish bad from good, or legitimate from illegitimate, regulatory institutions, although this is admittedly an important concern, especially for developing countries. The focus is on the experience of property creation by regulation in the United States and, to a lesser extent, the United Kingdom

both protects and sometimes creates property rights. The implications of this observation for property theory and jurisprudence, particularly in the realm of so-called regulatory takings law, are potentially significant.

The first part of the chapter compares two conceptions of regulation: (1) regulation as a governmental imposition on private property rights; and (2) regulation as a sometimes preferable alternative to the tort system for vindicating existing public and private property rights. The argument is made that the second conception, although not controversial among economists (at least since Coase 1960), is underappreciated by jurists and at least some justices on the U.S. Supreme Court. That part concludes with a call for property theorists to pay more attention to the role regulation serves in protecting and vindicating public, as well as private, property rights. The second part of the chapter argues, in the context of rights in airspace, that regulation not only vindicates and protects existing property rights, but creates property where none previously existed. In contrast to Roman law conceptions of the air as *res communes* and common law (or *faux* common law) conceptions of land boundaries extending up to the heavens, the historical record is clear that, prior to the last decades of the nineteenth century, the air was generally treated as *res nullius* or open-access, with only limited exceptions for cases where the pollution, over-hanging buildings, etc., interfered with the use and enjoyment of land-based activities. After the onset of the industrial revolution, which greatly increased the amount of pollution emitted into the air, the property status of the atmosphere began to change. Governments started to exercise sovereign authority over the airspace, initially in order to control aviation and later to regulate pollution. These sovereign acts implicitly, and sometimes explicitly, created and protected public property rights in clean air. More recently, governments have begun to privatize, albeit to a limited extent, property rights (notwithstanding government assertions that tradable permits are not property) to pollute the public's air. The chapter concludes by showing how the analysis might be expanded to marine resources, further strengthening its implications for property jurisprudence, particularly for the regulatory takings doctrine. Among those implications is the need for further development of theories of public property to complement existing theories of private and common property.

The Conventional Treatment of Regulation in Property Jurisprudence (and Its Problems)

Regulation is, generally speaking, a proactive alternative to the reactive tort system (Boyer and Porrini 2004; Glaeser and Shleifer 2003; Posner 1998; Shavell 1984: Wittman 1977).[4] Both systems share the ostensible purpose of preventing or internalizing the costs economic actors impose on neighbors, proximate or remote.[5] Some

and Europe, where property, market, and governmental institutions are generally well developed, functional, and adaptively efficient.

[4] Tort cases usually require proof of harm and therefore operate after the fact of harm. However, in rare cases involving so-called anticipatory or prospective nuisances, harm may be enjoined before the fact. Moreover, tort remedies generally have prospective incentive effects (Cole and Grossman 2005).

[5] Public choice theory has shed much light on the potential ulterior motives of regulators (Mueller 1989; Olson 1965) but has not focused nearly as much on the potential ulterior motives of judges (Beerman 1991).

jurists, however, tend to treat the two approaches to that goal as fundamentally different in kind. While tort suits for nuisance or trespass generally are presumed to vindicate personal and property rights violated by the actions (externalities) of neighbors (Cole and Grossman 2005; Posner 1998), regulations sometimes are portrayed too simply as government impositions on the property rights of regulated actors (Ogus 1994). Richard Epstein, for example, has claimed that "all regulations . . . are takings of private property *prima facie* compensable by the state" (1985, 95).[6]

Epstein's theory of property and takings has substantially influenced the U.S. Supreme Court's doctrine of "regulatory takings," which Justice Holmes invented (roughly speaking) in *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393 (1922).[7] Under that doctrine as expounded in subsequent cases, states must compensate regulated landowners for regulations that greatly diminish the value of their lands unless the externalities created by those regulated properties amount to common-law nuisances as in *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992).

As regulatory takings doctrine has evolved, particularly in several cases where privately owned lands meet publicly owned waters,[8] the Court has shortchanged very real public property rights at issue by focusing exclusively on the complainant's private property rights.[9] This myopia has led to perverse arguments and, quite possibly, unjust outcomes. For example, in *Palazzolo v. State of Rhode Island,* 533 U.S. 606, 637 (2001), Justice Scalia, writing in concurrence, labeled the State of Rhode Island a "thief" for a claimed "regulatory taking" of tidal marshlands to which it in fact held legal title.[10]

Contrast the U.S. Supreme Court's relative disregard of public property rights under recent regulatory takings doctrine with the Wisconsin Supreme Court's famous ruling in *Just v. Marinette County*, 56 Wis. 2d 7 (1972). In that case, which involved regulation of dredging and filling of wetlands adjacent to navigable water bodies, the court ruled that even though the regulation limited the extent to which

[6] To be fair, Epstein (1985) recognizes that regulations also benefit property owners by protecting them. Thus, the presumption he creates in favor of compensation is rebuttable if the regulation at issue creates reciprocal benefits that offset its costs. That said, the presumption operates in the first instance as treating regulation as an imposition.

[7] Holmes hinted at the idea of compensable regulatory takings several years earlier, while he was a justice on the Supreme Judicial Court of Massachusetts, in *Rideout v. King*, 19 N.E. 390 (1889). However, the *Pennsylvania Coal* case constituted the first ruling by any court that an ostensible police power regulation could amount to a taking if it "went too far" in diminished the value of property rights. Holmes's diminution-in-value test has no basis in either the text or the original understanding of the Fifth Amendment's takings clause (Cole 2002). But, then, Holmes never claimed to be either a textualist or an originalist.

[8] Those cases included, in addition to *Lucas*, *Nolan v. California Coastal Commission*, 483 U.S. 825 (1987), *Dolan v. City of Tigard*, 512 U.S. 374 (1994); *Palazzolo v. Rhode Island*, 533 U.S. 606 (2001); *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency,* 535 U.S. 302 (2002); and *Stop the Beach Renourishment v. Florida Department of Environmental Management*, 2010 U.S. Lexis 4971 (2010).

[9] Most recently, the Court paid more attention to preexisting public rights in *Stop the Beach Renourishment*. In that case, the Court unanimously upheld the State of Florida's assertion of property rights in artificially renourished (by avulsion as opposed to accretion) beaches above the mean high-tide line. It remains to be seen whether this ruling reflects a more general acknowledgment by members of the Court that public property rights deserve as much consideration as private property rights in takings claims where land meets water.

[10] The issue in *Palazzolo* was land use regulation that prevented the owner of oceanfront property from filling and building on coastal marshlands. Because those marshlands were subject to tidal flows, they were in fact owned by the state. State ownership became an issue, however, only after the case was remanded to the state courts. The main issue before the Supreme Court ruled was whether the petitioner could maintain a regulatory takings claim based on regulations that preceded his ownership. The Court was, however, briefed on the ownership issue, and had it decided the case on that basis in the first place, it would not have needed to reach the issue of compensation for a taking that occurred before the claimant's ownership.

the private landowner could develop his land, there was no compensable taking. Writing for a unanimous court, Chief Justice Hallows stated:

> [W]e think it is not an unreasonable exercise of [the police power] to prevent harm to *public rights* by limiting the use of private property to its natural uses . . . This is not a case of an isolated swamp unrelated to a navigable lake or stream, the change of which would cause no harm to *public rights*. Lands adjacent to or near navigable waters exist in a special relationship to the state. 56 Wisc. 2d at 17–18. (emphasis added)

The important point from *Just* is not that public property rights trumped private property rights; the outcome of the case is less important than the fact that the court properly treated it as a boundary dispute between privately owned lands and publicly owned waters.[11] I will return to this point later, when assessing the implications of a property theory that treats regulations seriously as a creator and protector of property.

To the extent that tort remedies and regulations share the goal of protecting some owners' property against unreasonable harm caused by other property owners' activities, such starkly differential judicial treatment of the two approaches seems inappropriate and even illogical. This is not to deny that regulations impose costs on the owners of regulated property, but so do common-law court rulings that hold landowners liable for nuisance or trespass. As Coase (1960) has noted, disputes over property are not about presumably innocent landowners seeking to vindicate harm/costs externalized by neighboring wrongdoers. Rather, they are bilateral or multilateral (that is, social-cost) conflicts over entitlements to resources that amount potentially to zero-sum games between two or more landowners, each of whom may be using his land in a perfectly lawful way. Whichever party receives the entitlement, the outcome inevitably imposes costs on the other party (or parties).

Coase's observation is no less true of common-law tort decisions than of public law regulatory resolutions: both create or vindicate some owners' property rights while imposing costs on others. This observation is borne out in two classic property cases (among many others): *Amphitheaters, Inc. v. Portland Meadows,* 184 Or. 336 (1948), and *Miller v. Schoene*, 276 U.S. 272 (1928). In the first, the Oregon Supreme Court resolved a property conflict using common law; in the second, the supreme court upheld a state regulatory law that resolved the conflict. The institutional and organizational approaches differed, but the purpose was fundamentally the same.

In *Portland Meadows*, an auto racetrack operated next door to an outdoor movie theater. In order to maximize revenues, weekday races were held in the evenings (after work for most potential customers), which of course required the use of lights. Despite substantial efforts by the racetrack owner to reduce the flow of light from the track to the neighboring drive-in theater, the lights interfered with the theater's operations. Both of the neighboring land uses were fully lawful, but they were

[11] Legal scholars and other social scientists have yet to develop a workable normative theory for resolving such boundary disputes (in which cases should public property trump private property, and vice versa?). This problem is symptomatic of the absence of a more general theory of public property, a problem addressed later in this chapter.

incompatible. The theater owner sued, and the Oregon Supreme Court ruled in favor of the defendant, on the grounds that the drive-in theater's use of its property was abnormally light sensitive. The theater, thus, had to bear costs of either building a high enough fence to block out light from the racetrack or converting its use of the land to something less light sensitive.[12] This outcome of the judicial process was not necessarily less expensive for the theater owner than an alternative public regulation placing the burden of excluding light on outdoor movie theaters. Had the case gone the other way, the racetrack owner would have incurred costs roughly equivalent to those resulting from a public regulation requiring landowners to fence in light.[13]

In *Miller v. Schoene*, the State of Virginia enacted a regulatory law requiring the destruction of infected cedar trees to prevent the spread of cedar rust disease, a condition that is harmless for cedar trees but toxic for apple trees. The legislation's decision to entitle apple trees over cedar trees was purely commercial. Apples are an important cash crop in Virginia, while cedar trees are grown mainly for ornamental use. Cedar tree owners challenged the state law as a compensable taking under the Fifth Amendment (as applied to the states by the Fourteenth Amendment). The Supreme Court rejected that claim, holding that the regulation was a legitimate police power regulation. Planting either cedar or apple trees is a perfectly lawful activity in Virginia, but when cedar trees and apple orchards are planted in close proximity to one another, they are incompatible, just like the racetrack and the drive-in movie theater in the *Portland Meadows* case. The main difference in the treatment of the two disputes is that *Portland Meadows* was resolved in court pursuant to common-law rules, while *Miller v. Schoene* was settled by the state legislature (subject to subsequent judicial challenge). The cedar rust problem in Virginia placed the state in a position in which it really had no choice but to entitle one kind of tree over the other. Even if it had chosen to do nothing, that would have constituted an implicit grant of entitlement to cedar tree growers, at substantial cost to apple growers. By deciding, instead, to regulate infected cedar trees, the state decided that cedar tree growers, rather than apple growers, should bear the costs.[14] The state, not unreasonably, decided to regulate cedar trees because that resulted (in the state's estimation) in the lowest net costs (a Coasean solution). In other words, Virginia deemed cedar tree growers (rightly or wrongly) to be the lower-cost avoiders

[12] Whether the court achieved the most efficient solution in *Portland Meadows* is unclear. According to Coase (1960), the efficient ruling would put the onus on the least-cost avoider of the harm. The fact that the racetrack owner had already undertaken some efforts to avoid the harm suggests, but does not necessarily mean, that the theater owner had become the least-cost avoider. Instead of undertaking a real Coasean analysis, however, the court simply invoked the common-law doctrine of abnormally sensitive use to determine the outcome, perhaps because of its intuition that the theater owner was the lower-cost avoider of the harm. Indeed, the doctrine of abnormally sensitive use might be only one device (among others) courts employ to avoid imposing liability on defendants in cases where plaintiffs seem more likely to be lower-cost avoiders.

[13] This situation is analogous to the case of alternative rules requiring the fencing-in or fencing-out of cattle in agricultural areas (Ellickson 1991). Of course, as Ellickson points out, the official legal rules do not necessarily constitute the rules in use or determine the outcome of disputes.

[14] In the mythical world of the "Coase theorem," where all the assumptions of neoclassical economic theory hold and transacting is costless, state allocation of the entitlement would have been both unnecessary and irrelevant because cedar tree growers and apple tree growers would have costlessly contracted their way to the maximally efficient outcome. Unfortunately, despite the hopes and dreams of many property scholars, transaction costs are ubiquitous and often quite high in the real world. Coase himself understands this; many self-described Coaseans still do not.

of the harm.[15] Did the state's regulation impose costs on them in excess of a court ruling holding that infected cedar trees constituted a private or public nuisance? If a court held that infected cedar trees did not constitute a nuisance, would that ruling have imposed no costs on owners of apple orchards?

The purpose of pointing out similarities in the respective purposes of court decisions and regulations with regard to property is not to argue that the two mechanisms are necessarily equivalent in their effects, nor to argue that regulation is generally preferable to common-law judgments. The preferability of one approach to the other is likely to be circumstantial. For instance, common-law remedies might well be more efficient than regulation in small-numbers cases, such as *Portland Meadows*, and other cases in which transaction costs are likely to be fairly low. Regulation tends to be preferable where transaction costs are higher, for example, in larger-numbers cases such as *Miller v. Schoene*. As Coase observes in "The Problem of Social Cost":

> There is no reason why, on occasion . . . governmental administrative regulation should not lead to an improvement in economic efficiency. This would seem particularly likely when, as is normally the case with the smoke nuisance, a large number of people is involved and when therefore the costs of handling the problem through the market or the firm may be high. (1960, 18)

A year earlier, in his slightly less famous article "The Federal Communications Commission," Coase wrote in a similar vein:

> When the transfer of rights has to come about as a result of market transactions carried out between large numbers of people or organizations acting jointly, the process of negotiation may be so difficult and time-consuming as to make such transfers a practical impossibility. It may be costly to discover who it is that is causing the trouble. And, when it is not in the interest of any single person or organization to bring suit, the problems involved in arranging joint actions represent a further obstacle. As a practical matter, the market may become too costly to operate.
>
> In these circumstances it may be preferable impose special regulations (whether embodied in a statute or brought about as a result of the rulings of an administrative agency). Such regulations state what people must or must not do. When this is done, the law directly determines the location of economic activities, methods of production, and so on. (1959, 29)

Coase acknowledges the potential inefficiencies of such "special regulations," resulting, for example, from public choice pressures on the "political organization" (1959, 29). However,

> This merely means that, before turning to special regulations, one should tolerate a worse functioning market than would otherwise be the case. It does not mean that there should be no such regulation. Nor should it be thought that, because *some*

[15] *Miller v. Schoene* has been of great continuing interest to legal scholars and economists (Buchanan 1972; Buchanan and Samuels 1975; Fischel 2007; Griffin 1981; Mercuro and Ryan 1980; Samuels 1971; 1972).

> *rights are determined by regulation*, there cannot be others which can be modified by contract. That zoning and other regulations apply to houses does not mean that there should not be private property in houses. Businessmen usually find themselves both subject to regulation and possessed of rights which may be transferred or modified by contracts with others. (Coase 1959, 29–30; emphasis added)

Other factors besides transaction costs, including deadweight costs, prospects of regulatory or judicial capture,[16] information asymmetries, and the potential for judgment-proof defendants, also can affect the choice between *ex ante* regulation and *ex post* liability (Boyer and Porrini 2004; Shavell 1984; White and Wittman 1983). And, of course, the two systems for vindicating or delineating property rights often are used in combination (Beckmann, Soregaroli, and Wesseler 2010).

Whatever reasons might exist for preferring one approach over the other in specific circumstances, it makes little sense for courts to treat regulations as something fundamentally different in kind from common-law remedies. Instead, property theory and jurisprudence should treat regulation with greater dignity as a legitimate means of vindicating or enforcing private, public, and common property rights.[17]

Creating Property out of Thin Air by Regulation and Other Acts of Sovereignty

Regulations and similar sovereign acts not only protect some property rights while imposing on others, but also can create property rights where they did not previously exist or were unclear. However controversial this assertion may seem at first blush, a simple uncontroversial example (unrelated to rights in the air) should mollify skeptics, at least to some extent.

The takings doctrine stems from language in the Fifth Amendment to the U.S. Constitution, which is a kind of meta- or superstatute (Howard 1968; Wood 1999).[18]

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[16] Regulatory capture is a familiar category (Huntington 1952; Laffont and Tirole 1991). Judicial capture is less so, but only because too many legal scholars casually presume that at least in the United States, judges are independent and not subject to bias for or against parties appearing before them (Waldron notes that political scientists, "unlike law professors, . . . have the good grace to match a cynical model of legislating with an equally cynical model of appellate and Supreme Court adjudication" [1999b, 31]). The specter of judicial capture arose most recently in the wake of the British Petroleum Deepwater oil spill. After the spill, the Obama administration imposed a six-month moratorium on deepwater oil drilling. Various oil companies and associated service industries challenged that moratorium in federal court. Judge Martin L. C. Feldman of the U.S. District Court in New Orleans overturned the moratorium. Whether or not his decision was correct as a matter of law, many were troubled by Judge Feldman's substantial financial ties to the oil and gas industry, including investments in several firms that potentially benefited from his decision. Charlie Savage, "Drilling Ban Blocked; U.S. Will Issue New Order," *New York Times*, June 22, 2010, http://www.nytimes.com/2010/06/23/us/23drill.html. The Obama administration appealed Judge Feldman's ruling to the Fifth Circuit U.S. Court of Appeals. According to a report by the Alliance for Justice, "Judicial Gusher: The Fifth Circuit's Ties to Oil," fourteen of the twenty judges (including four senior judges) on that court, which covers Louisiana, Texas, and Mississippi, have significant financial ties to the oil and gas industry, with individual judges holding investments worth up to several million dollars. Before their appointments to the bench, eleven current Fifth Circuit judges represented oil and gas companies and/or worked at firms that specialized in oil and gas law; http://www.afj.org/about-afj/press/fifth_circuit_judges_report.pdf.

[17] This argument about taking regulation seriously as a means of vindicating existing private and public property is broadly consistent with the theory of legislation offered by Waldron (1999a).

[18] Eskridge and Ferejohn (2001) use the phrase "super-statute" to describe legislative enactments that are not constitutions but acquire some kind of constitutional force. That is not the meaning here.

The Fifth Amendment's takings clause created an enforceable right of landowners to prevent government expropriations that are either (1) not for public use[19] or (2) uncompensated.[20] No court created (or "discovered") those rights, along with the corresponding duties imposed on governments. Congress created them in 1789, and they were constitutionalized two years later upon ratification by three-fourths of the states. By literally regulating the government's exercise of eminent domain, the Fifth Amendment's takings clause created property rights and duties that had not previously existed anywhere in the world. This interpretation of the takings clause should not be controversial. It stands as a prime example of how regulation can create property.

This section explores two specific and interrelated contexts in which regulatory regimes have, either expressly or in effect, converted nonproperty air resources to private or public property (or public/private hybrids): (1) the implicit conversion of nonproperty atmosphere to public property through regulations and other acts of sovereignty; and (2) the subsequent conversion of some of that public property to private property in regulatory programs, such as the Clean Air Act's emissions-trading Acid Rain Program.

Air Rights at Common Law

A legal tradition dating back to Justinian's *Institutes* (Grapel 1994 [1855]) considers the air to be the common property of all, an open-access resource from which no person or state can exclude any other. Influenced by Roman law, the common law of England and Wales generally treated the atmosphere as an open-access commons, even where air pollution was involved. Polluters were limited only to the extent their emissions provably harmed people or property on the ground (Morag-Levine 2003).

By the later Middle Ages, however, a new legal conception of air as private property (*res privatae*) arose to compete with the Roman law conception of the atmosphere. Embodied in the maxim *cujus est solum, eius est usque ad caelum et ad inferos*, private property boundaries extended upward from the ground to the heavens and downward to the depths of the earth.[21] Although the maxim is sometimes misattributed to Roman law,[22] it was first articulated in the thirteenth century by the Italian lawyer Franciscus Accursius of Bologna (1225–1293), who lectured in

[19] The Supreme Court presently interprets the public use requirement of the takings clause to prohibit government exercises of eminent domain for purely private uses or purposes. See *Kelo v. City of New London*, 545 U.S. 469 (2005). The fact that the Court's interpretation is controversial should have no bearing on the fact that the takings clause itself creates rights in property by regulating (to whatever extent) government power.

[20] The Fifth Amendment also recognized, by necessary implication, the government's power of eminent domain, which can be thought of as, ostensibly at least, a public property right, albeit one that might exist regardless of a written constitution, as an inherent power of government (S. Reynolds 2010). Certainly, many jurists and judges have accepted it as such (Stoebuck 1972).

[21] Functionally similar phrases have been found in legal systems stretching from Portugal to Turkey (Banner 2008; Nijeholt 1910). However, in several European countries, including Switzerland and Germany, the extent of property rights above and below the ground was early on expressly restricted to areas that "may be of productive value" to the landowner (Banner 2008; Valentine 1910b, 96).

[22] According to Roman law, mines and treasures in what we now call the subsurface estate belonged to either the monarch or the finder, depending on the circumstances, rather than the landowner. Indeed, the landowner did not necessarily control any space above or below the surface of the earth (Banner 2008). More generally, the air was *res communes* (the common property of all) according to Roman law.

law at Oxford from 1275 to 1276 at the invitation of Edward I (*Bocardo SA v. Star Energy UK Onshore Ltd. and another,* [2009] EWCA Civ. 579).[23] In recent decades, some English jurists have mistakenly denied that it ever became part of the common law (*Bocardo*). Lord Wilberforce, writing for the Privy Council in the 1974 case *Commissioner for Railways v. Valuer General*, [1974] 1 A.C. 328 at 351H–352A, 3 All E.R. 268, [1973] 2 W.L.R. 1021, stated that "so sweeping, unscientific and unpractical a doctrine is unlikely to appeal to the common law mind." Lord Wilberforce's skepticism notwithstanding, there is no doubt that the maxim had a life in the common law of both England and the United States. The only real issue is whether it described actual legal rules in use or was a mere dictum.

The maxim's incorporation into the common law of England dates to Justice Coke, who quoted it approvingly in the late sixteenth century to resolve boundary disputes concerning overhanging buildings (Banner 2008). Coke also quoted the maxim in *Coke upon Littleton*, the first volume of his *Institutes of the Lawes of England* (1628–1644), but there he hedged a bit, noting that "the earth has, in law, a *great extent* upwards" (Coke 1832 [circa 1628], 4a; emphasis added). In fact, Coke, like later judges who cited the *cujus est solum* maxim, was practically concerned not with the maximal limits of property rights above and below the ground but with the immediately useful regions of airspace and subsurface. Beyond the relatively shallow areas above and below the ground that were actually in dispute in the cases Coke decided, his use of the maxim was hyperbole (Sprankling 2008). Perhaps most tellingly, Coke did not invoke the maxim when he decided *Aldred's Case*, [1611] 77 Eng. Rep. 816, the first common-law nuisance case to impose liability for air pollution.

After Coke, the *cujus est solum* maxim virtually disappeared from common-law jurisprudence until the end of the eighteenth century, when William Blackstone restated it with emphasis in his *Commentaries on the Laws of England*: "Land hath also, in its legal signification, an indefinite extent, upwards as well as downwards" (1979 [1766], 18). Blackstone inaccurately argued that the maxim was a bedrock principle of the common law of property, as exemplified in "every day's experience in mining countries." As Sprankling (2008) has noted, during Blackstone's own lifetime mines rarely reached a depth of even one thousand feet—hardly the center of the earth. With respect to airspace, Blackstone referred only to Justice Coke's cases of overhanging buildings, which rarely were more than a few stories high—hardly the heavens.

In the United Kingdom, Blackstone's resurrection of the *cujus est solum* maxim did not significantly affect the common law; the maxim was cited in only a handful of U.K. cases and treatises (Sprankling 2008). But Blackstone's outsized influence on the U.S. common law (Boorstin 1941) led to the widespread judicial quotation of the maxim in American case law (Banner 2008). As the Sixth Circuit U.S. Court of Appeals noted in *Swetland v. Curtiss Airports Corp.*, 55 F.2d 201, 202 (1932), "The popularity of the phrase with the courts of this country is attested by its repetition in the law reports of practically every state." Most courts quoted the phrase in the context of disputes over subsurface minerals; only rarely was it invoked in cases

[23] Others have asserted that the maxim was first articulated nearly one hundred years later by another Italian jurist, Gino da Pistoia (Banner 2008).

involving property rights in the air. In virtually all cases, it was stated as a dictum rather than as a literal rule of law.

In cases involving alleged trespass on airspace, courts in both the United States and the United Kingdom early on limited property rights to the immediately usable atmosphere above the ground. This created a line-drawing problem: what part of the air was immediately usable? For the most part, however, the maxim was cited by judges "in connection with occurrences common to the era, such as overhanging branches or eaves" (*Swetland*, 55 F.2d at 203). However, as technological innovations, such as electrical wires, elevated railways, and skyscrapers, altered the extent to which airspace was usable, the line-drawing problems recurred (Banner 2008).

In drawing the lines, most courts refused to apply the *cujus est solum* maxim literally. The Georgia Supreme Court, in *Thrasher v. City of Atlanta*, 178 Ga. 514, 173, S.E. 817, 825 (1934), spoke for many courts in holding that the maxim was nothing more than a "generalization from old cases involving title to space within the range of actual occupation, and any statement as to title beyond was manifestly *mere dictum*" (emphasis added). On that account, *cujus est solum* never described the actual legal rule in use. Other courts accepted that the maxim might have once described the common-law rule, but they expressly overruled it. As one court put it, "If that maxim ever meant that the owner of land owned the space above the land to an indefinite height, it is no longer the law" (*Rochester Gas and Electric Corporation v. Dunlop*, 148 Misc. 849, 266 N.Y.S. 469, 471 [1933]).

Between 1930 and 1936, five courts addressed the issue of aerial trespass. None concluded that flights at high altitudes constituted trespasses (Banner 2008). In 1946 the U.S. Supreme Court once and for all eliminated *cujus est solum* from American law, at least insofar as airspace is concerned. In *United States v. Causby*, 328 U.S. 256, 261 (1946), the Court declared that the maxim "has no place in the modern world." The case arose from the extension of an airport runway used during World War II to accommodate bombers, transports, and fighters. The plaintiffs claimed that the runway extension amounted to a taking of their chicken farm because arriving and departing aircraft, flying low enough to blow leaves off the trees, literally scared their chickens to death.

The Court in *Causby* found a compensable taking—specifically, it held that the federal government had taken an easement over the plaintiffs' property—but it also took the opportunity to (1) repudiate the *cujus est solum* rule; and (2) redraw (if only vaguely) the boundaries between privately owned and publicly owned parts of the atmosphere. The Court found that "if the landowner is to have full enjoyment of the land, he must have exclusive control of the immediate reaches of the enveloping atmosphere. Otherwise buildings could not be erected, trees could not be planted, and even fences could not be run" (*Causby*, 328 U.S. at 264). Beyond those "immediate reaches," however,

> [t]he air is a *public* highway . . . Were that not true, every transcontinental flight would subject the operator to countless trespass suits. Common sense revolts at the idea. To recognize such private claims to the airspace would clog these highways, seriously interfere with their control and development in the public interest,

> and transfer into private ownership that to which *only the public has a just claim*. (*Causby*, 328 U.S. at 261; emphasis added)

The Court's emphasis on public rights is crucial for understanding that the Court was not declaring the higher reaches of the atmosphere to be open access; rather, it was drawing boundaries, however vague, between private property in the usable airspace immediately above the ground and public property in the airspace beyond that area. The publicly owned airspace was not open access because the state asserted its sovereignty and limited access to it, for example, through civil aviation regulations. Interestingly, as Banner notes, not one of the five justices who ruled with the majority in *Causby* "expressed any support for recognizing private property rights in airspace" (2008, 249). But that was the outcome of their ruling.[24]

The *Causby* Court did not attempt to draw precise and rigid boundaries between the privately owned and publicly owned parts of the air, presumably because it understood that as a practical matter, the boundary would have be drawn at different altitudes in different locations. The immediately useful airspace above a given lot in midtown Manhattan is likely to be much higher than the immediately useful airspace above a farm in rural Iowa.[25] Indeed, in larger cities, private property rights in airspace have been legally recognized and bought and sold since before the twentieth century (Banner 2008).[26] Conceivably, a power company might seek to establish a wind farm in rural Iowa with generating towers and rotor blades reaching heights above four hundred feet. Doing so might constitute an act of occupation giving rise to private property rights in higher altitudes of airspace (implicitly converting some publicly owned airspace to private ownership). As always, the precise contours of the law are influenced by local circumstances, including commercial considerations.[27]

Beyond repudiation of the *cujus est solum* maxim, express recognition of public property rights in the higher atmosphere, and express recognition of private property rights at lower reaches of the atmosphere, the Court's opinion in *Causby* is important for several other reasons. It (1) illustrates how common-law property rules can and do change over time in response to changing circumstances, including technological changes; (2) takes seriously the importance of setting practicable boundaries between privately owned lands and publicly owned airspace; and (3) expressly

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[24] Justice Black dissented from the Court's decision. In conference (but not in his written dissent), he argued that there could be no taking because the respondents could not have had private property rights in the air in the first place; the air "is supposed to belong to everyone" (Banner 2008, 248). Justice Reed, who for some reason did not dissent from the Court's ruling, went even farther in the conference, claiming that "air is public property" (Banner 2008, 248).

[25] Even at a single location, the boundaries might be changeable over time as changing circumstances dictate, in much the same way in which land boundaries move in response to accretion, avulsion, and erosion (Gletne 2008).

[26] In 2005 the value of "air rights"—essentially the right to develop upward to the limits set by local zoning rules—in Manhattan reached $430 per square foot (*San Diego Union Tribune*, November 30, 2005). Even in large cities, of course, ownership of higher reaches of the air is not absolute, but is subject to lawful public rights, including, for example, zoning restrictions and historic preservation rules (*Penn Central Transportation Co. v. New York City*, 438 U.S. 104 [1978]).

[27] That commercial considerations affect legal property relations has been clear at least since the 1707 case *Keeble v. Hickeringill*, 11 East 574, 103 Eng. Rep. 1127, which appears to be the first common-law ruling to define property relations functionally to distinguish lawful market competition from unlawful "malicious" interference with trade. Chief Justice Holt found a trespass to chattels (in this case, ducks) without any discussion of formal legal conceptions of possession, ownership, or boundaries.

recognizes the significance of transaction costs in setting those boundaries. Most important, the case shows that courts, like regulatory agencies, do not simply vindicate or enforce private property rights but allocate property rights in the first place. Explicit judicial recognition of public rights in the atmosphere allowed the government to organize and control access and use.

A legal formalist or old Roman lawyer might claim that the public rights recognized by the Court in *Causby* constituted *imperium* (sovereign authority) rather than *dominium* (property ownership). But arcane Roman law distinctions between *imperium* and *dominium* make little practical difference (Cole 2002). As Cambridge University's first professor of land economy, D. R. Denman, explained, property and sovereignty are both forms of power—"a sanction and authority for decision-making"—over resources (1978, 3).[28] In treating property and sovereignty as functionally similar concepts, Denman was participating in a legal tradition extending back to the early seventeenth century, when Grotius wrote of sovereignty as "a particular kind of proprietorship, such in fact that it absolutely excludes like possession by anyone else" (1916 [1609], 22). Three hundred years later, the Scottish legal scholar G. D. Valentine, writing specifically about use of the atmosphere, observed that "exclusive control" is "the most important element in sovereignty" (1910a, 19). He further argued that state sovereignty over the air amounts to *res publicae*: "The atmosphere, like a river, is public and cannot fall within the patrimony of any person" (Valentine 1910b, 87–88).[29] Valentine did not deny that private landowners possessed limited rights in the air based on use and enjoyment of underlying lands, but they could have "no direct right as owner[s] of the atmosphere" (1910b, 88).[30] More recently, Stuart Banner (2008) has noted how assignments of property and acts of sovereignty serve the same basic function. Richard Barnes concurs: "When sovereignty is exercised over things, say territory or natural resources, then sovereignty takes on the lineaments of property. Sovereignty in this sense is in effect a claim to an exclusive regulatory authority over a defined spatial extent or *res* . . . When . . . exercised over territory and the resources therein, it is clearly analogous to a regime of property" (2009, 223).[31] Each of these claims equating sovereignty and property, at least functionally, is consistent with a critical element of the argument that regardless of whether the state purports to act as sovereign or owner, the rights it asserts are in the nature of property (Cole 2002). This argument is, in turn, consistent with the definition of "property rights" provided earlier (see Chapter 2, note 2, above). Acts of sovereign authority over natural resources create legally enforceable rights over things, along with corresponding duties enforceable against others, including other states, private groups, and individuals.

[28] The legal philosopher Morris Cohen also sought to explode the distinction between *dominium* and *imperium*, but not by focusing on control of resources. Rather, Cohen claimed that "dominion over things is also *imperium* over our fellow human beings" (1927, 13).

[29] Interestingly for a legal scholar writing early in the twentieth century, Valentine expressly and pretty accurately defined air as a public good: "It can be enjoyed by many persons together and without their excluding each other" (1910b, 86).

[30] Somewhat confusingly, Valentine (1910b) later suggests that the right of free passage through airspace is basically an easement across what is otherwise private property in the air.

[31] Later, Barnes observes that "international law does not grant 'property rights' to States," but "defines the scope of their sovereignty." Nevertheless, he concludes, the phrase "sovereign rights," as used in international law, "amounts to much the same thing" as property (2009, 274).

As far as rights to pollute or rights to clean air are concerned, the *Causby* Court's eradication of the *cujus est solum* maxim was immaterial because courts had never even cited that maxim, let alone applied it as the legal rule, in cases involving air pollution. Long before *United States v. Causby*, courts in both the United States and the United Kingdom had treated air-pollution cases under nuisance law (which protects the rights to use and enjoy land) rather than trespass (which protects the right to exclude) (Morag-Levine 2003). The *cujus est solum* maxim concerns property boundaries, which gives it obvious relevance for trespass claims, but little utility in suits to vindicate use and enjoyment of the surface estate. As noted earlier, even Justice Coke, who first imported the maxim into the common law, did not so much as mention it in his famous air-pollution ruling (*Aldred's Case*), where liability was based not on trespass by smoke or odors (a cause of action the common law has never recognized) but on the "necessity" of "wholesome air" to the use and enjoyment of land (9 Co Rep 57b, 77 ER 816 [1610]). A comprehensive review of U.S. and U.K. case law turns up not a single instance in which a court relied on the *cujus est solum* maxim to resolve an air-pollution dispute.[32]

In the final analysis, the common law of property, both before and after *Causby*, was far more complex and nuanced than was implied either by the old Roman law assertion of pure common property or by the *cujus est solum* maxim's assertion of pure private property. Anglo-American property regimes governing the atmosphere are best viewed as admixtures of public, private, common, and nonproperty/open-access. Consider, for example, the modern common-law doctrine of nuisance. So long as air pollution does not unreasonably interfere with neighbors' use and enjoyment of land (and, of course, the neighbors must be able to prove the harm, the source, and causation), liability does not attach at all; the atmosphere itself remains, in effect, an open-access sink for "reasonable" levels of pollution. When air pollution causes "unreasonable" harm, the polluter is subject to damages or, much less frequently, injunctive relief. These nuisance remedies vindicate not only private property rights, but public property as well. As one English court explained, "[I]n cases of public nuisance the injury is to the property of mankind" (*Attorney General v. Sheffield Gas Consumers Co.*, 3 DeG.M. & G. 304, 320 [1853]). In sum, then, nuisance law provides limited protection for both private and public property, but leaves polluters at liberty to emit "reasonable" levels of pollution into the atmosphere.

Creating Property Rights in the Atmosphere by Acts of State Sovereignty and Regulation

Public property rights in air did not arise solely as a result of judicial rulings. They also came from express assertions of sovereign authority via treaties, legislation, and regulations.[33] Those assertions of sovereignty over the atmosphere arose both in Europe and in the United States at about the same time and in response to the same

[32] A Lexis search of all U.S. and U.K. case law using the search connectors "(cujus or cuius) w/seg ('air pollution' or smoke or odor)" turned up only a single mention of the maxim in an air-pollution case, *Gainey v. Folkman*, 114 F. Supp. 231 (D. Ariz. 1953), but the court expressly rejected it as a basis for decision.

[33] More generally, many property institutions usually considered to be solely creatures of the common law, including both nuisance and trespass, have deep roots in statutory law. Nuisance and trespass both originated in the twelfth century in an English statute known as the assize of novel disseisin (Loengard 1978; Woodbine 1925).

technological changes, especially the development of aviation, that created so much judicial consternation over the meaning and force of the *cujus est solum* maxim.

By the first decades of the twentieth century, lawyers and jurists were arguing for legal possession and control of the air as an incident of state sovereignty to facilitate and control aviation over states' territories (Banner 2008). H. Earle Richards, an Oxford professor of international law, wrote that "so long as the law of gravity prevails, a State must have unfettered control over air vessels passing above its territory in order to protect itself" (1912, 8). It was a matter of national security. Without the authority to restrict access to its airspace, as well as its land borders and sea ports, a state would be liable to attack from above (Richards 1912; Valentine 1910a). The irresistible logic of such claims, particularly given the specter of imminent war in Europe, led directly to state assertions of sovereignty over airspace. The British government was the first to act in 1913, introducing regulations that prohibited foreign aircraft from flying over British territory without advance permission. France and Germany quickly followed suit (Banner 2008). The onset of World War I, the first large-scale war in which aircraft routinely featured, a year later vindicated these decisions to exercise "complete sovereignty" over airspace (Banner 2008, 63).

The United States, which was not threatened by air attacks during World War I, did not enact a similar law regulating use of its airspace until the 1926 Air Commerce Act (69 P.L. 254, 44 Stat. 558), which provided that "the United States of America is . . . to possess and exercise complete and exclusive national sovereignty in the air space above the United States." This law, like earlier assertions of sovereign authority by European countries, hardly facilitated international civil aviation,[34] but the laws did, in effect, convert the atmosphere from open access to public property, at least as far as aviation was concerned. The phrase "to possess and exercise complete and exclusive . . . sovereignty," as used in the 1926 Air Commerce Act, is perfectly consistent with the property-law concept of "exclusive possession."

Early twentieth-century assertions of sovereignty in the atmosphere were not solely concerned with aviation. Increasing levels of air pollution also led to state actions that had consequences for property rights in the atmosphere. In *Georgia v. Tennessee Copper Co.*, 206 U.S. 230, 237–8 (1907), Justice Oliver Wendell Holmes, writing for a unanimous Court,[35] made clear that control over air pollution is a basic attribute of state sovereignty:

> The State owns very little of the territory alleged to be affected [by air pollution emissions from the respondent's copper mine], and the damage to it capable of estimate in money, possibly, at least, is small. This is a suit by a State for an injury to it in its capacity of quasi-sovereign. In that capacity the State has an interest independent of and behind the titles of its citizens, in all the earth and air within

[34] International treaties, including the Convention on International Civil Aviation, which took effect in 1947, subsequently facilitated international aviation without compromising state sovereignty.

[35] Justice Harlan authored a concurrence in which he disagreed with aspects of Justice Holmes's opinion not directly relevant to the section quoted here.

> its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air. . . .
>
> It is a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted on a great scale by sulphurous acid gas, that the forests on its mountains, be they better or worse, and whatever domestic destruction they have suffered, should not be further destroyed or threatened by the act of persons beyond its control.

States and municipalities had not been awaiting Justice Holmes's imprimatur to regulate air pollution. Long before the Supreme Court's decision in *Georgia v. Tennessee Copper Co.*, state and local governments had enacted numerous statutes, ordinances, and regulations to protect public health and property from air pollution. In 1867 St. Louis enacted what may have been the country's first air-pollution ordinance, which required all chimneys to rise at least 20 feet above surrounding buildings (Morag-Levine 2003).[36] Chicago followed in 1880 with a different approach to smoke regulation. Section 1650 of the Chicago ordinance summarily declared: "The emission of dense smoke from the smoke-stack of any boat or locomotive, or from any chimney, anywhere within the city, shall be deemed and is hereby declared to be a public nuisance." The provision did not define "dense smoke," and residential chimneys were exempted, but violators of the smoke ordinance were subject to a fine of "not less than five dollars nor more than fifty dollars" (§ 1651) (Cole 2002, 31).

Laitos (1975) has identified three specific types of air-pollution regulation in the late nineteenth century (not including the St. Louis tall-stacks approach). The first type, like Chicago's, declared air pollution a nuisance and imposed fines, rarely exceeding $100, for violations. A second type of regulation went further and required polluters to take affirmative steps to control or minimize their emissions, for instance, by building furnaces to consume more of the smoke they produced. A third type of regulation focused not on emissions, but on the fuel used, banning consumption of any coal containing more than 12 percent ash or 2 percent sulfur. This type of regulation actually had the longest pedigree of all. In 1306 the City of London for the first (but not the last) time attempted to deal with local air-pollution problems by banning, upon penalty of death, the importation and burning of "sea-coal," a heavily polluting bituminous coal shipped by sea from northeast England (Brimblecombe 1987, 9).[37] Parliament enacted the United Kingdom's first nationwide

[36] Tall-chimney requirements were a very popular form of air-pollution regulation into the late twentieth century. The legal and economic implications of such regulations are interesting. When emissions are emitted at a higher altitude, they typically drift farther away from the locality. This does not mean that they no longer constitute externalities, but only that they are externalized farther afield. The pollution may still harm public health and property when it falls to earth, but (1) that is not a problem so far as the local community, for example, the municipality of St. Louis, is concerned, and (2) nuisance suits are more difficult to sustain because plaintiffs located farther from the pollution source have a harder time identifying defendants and proving causation. From a property perspective, St. Louis's approach to local air-pollution problems implies that it was not concerned primarily with the use of the atmosphere as a pollution sink, but with the effects of the pollution on uses and users on the ground.

[37] The ban applied only to sea-coal ostensibly because it was less expensive, and therefore more widely used, than less-polluting anthracite coal, which was mined locally but in shorter supply. Public choice scholars have not yet examined the possibility that the City of London's ban on sea-coal was based (at least in part) on ulterior motives

smoke law in 1819, about half a century before American cities began enacting their first smoke ordinances (Morag-Levine 2003).[38]

Far from being a newfangled invention of the "nanny state" (Harsanyi 2007), public regulation of air pollution to protect public health and vindicate public property rights has a very long history. However, the air-pollution regulations that emerged during the twentieth century were different in several important respects: (1) they were greater in number; (2) they were more detailed and costly for polluters; (3) they were enacted at multiple levels of government—municipal, state, and eventually federal; and (4) their effectiveness was greatly enhanced by improving monitoring and enforcement technologies.

From the outset, some reviewing courts recognized that the various regulatory laws created and/or protected public property rights in the atmosphere. For example, when San Diego's Air Pollution Control District required gasoline stations to install vapor recovery devices on gas pumps, the California Court of Appeals, in *Mobil Oil Corp. v. Superior Court of San Diego City*, 59 Cal. App. 3d 293, 305 (1976), upheld the regulation as a valid measure designed to protect public property rights in clean air:

> Here it appears the Oil Companies are asking us to determine they have a fundamental vested right to release gasoline vapors while dispensing fuel to their customers. How are we to answer the public, on the other hand, who assert a fundamental vested right to breathe clean air? If either exists, it must be the latter.

The court expressly rejected the claim of a private entitlement to pollute and enforced public property rights in the atmosphere. But did those public property rights antedate the regulation, or were they created by it? The court's decision provides no guidance on this important question. Arguably, before state regulation, the atmosphere was de facto, and possibly de jure, open access for air pollution from gas pumps. The regulation itself converted the atmosphere from open access to public property subject to limited private access, not as of right, but as authorized by law.

Similarly, when a Michigan state appellate court upheld a judge's decision enforcing the state's 1965 Air Pollution Act (as amended) against a power plant, the court stated:

> [T]here exists no right to pollute. Since no such right exists, a polluter has not been deprived of any protected property or liberty interest when the state halts the pollution. (*Detroit Edison Co. v. Michigan Air Pollution Control Commission*, 167 Mich. App. 651, 661 [1988])

Moreover, the court agreed with the trial judge that "the Act read as a whole evince[s] a clear legislative intent to give the Commission broad authority to carry out its task of protecting the quality of Michigan's air" (*Detroit Edison Co.*, 167 Mich. App. at 659). The phrase "Michigan's air" is intriguing. Did the court mean to imply that

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to support local mining interests. Certainly, such ulterior motives have affected U.S. regulation of air pollution under the Clean Air Act (Ackerman and Hassler 1981).

[38] On the history of smoke abatement in nineteenth-century Britain, see Flick (1980).

the 1965 Air Pollution Act constituted an assertion of state ownership, that is, public property, in the atmosphere above the state of Michigan? Such a claim would have been consistent with the court's assertion that "there exists no right to pollute." On the other hand, the court might have been making a simple jurisdictional or locational point in referring to "Michigan's air." But if that was the intended meaning, then how are we to understand the state's lawful exclusion of the utility's emissions within the conventional framework of property systems? Regulatory authority is generally said to emerge from the police power, which is an inherent element of state sovereignty (Dubber 2004; G. H. Reynolds and Kopel 2000). But if assertions of state sovereignty constitute implicit or explicit public property claims, as I claim, then the assertion of property rights is implicit rather than explicit. Either way, the 1965 Air Pollution Act asserts public property in "Michigan's air."

Some states have asserted public property rights explicitly. Consider the following provision from the Constitution of the State of Pennsylvania, entitled "Natural Resources and the Public Estate" (Article 1, Section 27):

> The people have a *right* to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the *common property* of all the people, including generations yet to come. As *trustee* of those resources, the Commonwealth shall conserve and maintain them for the benefit of all the people. (emphasis added)[39]

If that is not an express assertion of public property (despite the somewhat misleading use of the phrase "common property"), then it is difficult to imagine what would be. It is unlikely for political reasons that state officials would ever seek to enforce to the fullest extent the state's property rights in the air, waters, and other natural amenities of Pennsylvania, that is, by excluding any and all private uses, but it would not be obviously unconstitutional. To avoid that politically untenable outcome, the state has interpreted Article 1, Section 27, with the Pennsylvania Supreme Court's approval, in a way that requires it to balance its role as trustee of publicly owned natural resources, including the air, against other state needs, including economic development (*Payne v. Kassab*, 468 Pa. 226, 246 [1976]).[40] In *Eagle Environmental II, L.P. v. Commonwealth of Pennsylvania*, 584 Pa. 494, 514 (2005), the Pennsylvania Supreme Court noted the need to balance the environmental protections constitutionally required under Article 1, Section 27, with the state's need to provide locations for solid waste disposal. Consequently, the state, as environmental trustee, is not always required to conserve the resources it owns in trust for the

[39] This constitutional provision was adopted in 1971.

[40] The court's conclusion that the protections of Article 1, Section 27, require balancing against other state obligations rests on a questionable foundation. The court merely notes that the state has other "duties," including, for example, the statutory duty to maintain an adequate public highway system (*Payne*, 469 Pa. 226 at 246). It is not at all clear, however, why or how a constitutional obligation to protect public resources requires balancing against duties created under ordinary statutes. Clearly, the court in *Payne* was looking for a hook to avoid interpreting Article 1, Section 27, in a way that would automatically disrupt all private or public development activities. However, it should have been able to find a better hook. The court left open the question whether the state could choose to apply Article 1, Section 27, to have that effect.

public. Thus, Article 1, Section 27 does not prohibit any and all development activities, but allows the state, by virtue of its legal ownership as trustee of state natural resources, to ensure "controlled development" (*Concerned Citizens for Orderly Progress v. Commonwealth of Pennsylvania, Dept. of Environmental Resources*, 36 Pa. Commw. 192, 199 [1977]).

But what if Pennsylvania chose to prevent all (or nearly all) development of privately owned lands to protect state resources, exercising to the utmost its constitutional authority under Article 1, Section 27? Such a choice would expose a latent constitutional conflict between Article 1, Section 27, and Article 10, which specifies, "[N]or shall private property be taken or applied to public use, without authority of law and without just compensation being first made or secured." Which constitutional provision would prevail over the other? The issue has not yet arisen in Pennsylvania,[41] but the California Supreme Court, in a closely analogous setting, has ruled that constitutional public property rights (under the so-called public trust doctrine) would prevail over private property in any taking suit.[42]

Federal Assertions of Public Rights in the Atmosphere to Control Air Pollution

Long after state governments began asserting sovereign authority and public ownership over the atmosphere, the federal government began to stake its own claims. The impetus for federal action came from increasing public concern over environmental issues that state and local pollution-control efforts did not appear to be resolving. During the 1950s and 1960s, air pollution from both stationary and motorized sources continued to increase despite state and local regulations (Menell and Stewart 1994). The federal government, however, did not simply jump into the fray with both feet. Federal environmental policy evolved slowly and cautiously, starting shortly after the end of World War II, at least partly because of uncertain constitutional authority for direct federal regulation of intrastate air pollution.

Before the mid-1960s, the federal government restricted its role in air-pollution control, generally speaking, to funding research and providing aid to state programs. Initial federal forays into direct regulation began in 1965 with the Motor Vehicle Air Pollution Control Act (Pub. L. 89-272, 79 Stat. 992), which authorized the secretary of health, education, and welfare (HEW) to set national standards for motor vehicle emissions, and continued in 1967 with the Air Quality Act (Pub. L. 90-148, 81 Stat. 485), which authorized the HEW secretary to designate air-quality-control regions around the country, including interstate regions, for which states would be required to promulgate air-quality standards and plans for achieving

[41] It seems clear, however, that the State of Pennsylvania could be required to compensate for a taking under the U.S. Constitution, given current Supreme Court doctrine, if its "controlled development" policies greatly diminished the value of affected privately owned lands. The Fifth Amendment's takings clause, applicable to the states via the Fourteenth Amendment, sets a federal constitutional limit that no state can avoid through contrary state constitutional provisions (Cole 2006). The federal limit is only a floor; states are allowed to provide greater (but not lesser) protections.

[42] See *National Audubon Society v. Superior Court of Alpine County*, 658 P.2d 709 (1983) (holding that private interests in water are limited to nonvested use rights, which remain perpetually subject to the state's superior title under the public trust doctrine, embodied in Article 10 of the state's constitution). Of course, California Supreme Court decisions carry no necessary influence in Pennsylvania.

those standards. These limited federal intrusions into the state-dominated field of air-pollution control turned out to be merely precursors to a major federal incursion, which occurred three years later in the 1970 Clean Air Act Amendments.[43]

The 1970 Clean Air Act (42 U.S.C. §§ 7401–7671q) marked a major, but incomplete, shift of power over environmental protection from the states to the federal government, symbolized by the creation of an entirely new federal agency, the Environmental Protection Agency (EPA), to implement and enforce the new law.[44] The act subsumed and greatly expanded on precursor laws, including the 1965 Motor Vehicle Pollution Control Act and the 1967 Air Quality Act, and it set the standard for other federal environmental statutes that followed, including the Clean Water Act of 1972, the Coastal Zone Management Act of 1972, the Endangered Species Act of 1973, the Safe Drinking Water Act of 1974, the Toxic Substances Control Act of 1976, and the Resource Conservation and Recovery Act of 1976.

The federal government's large-scale takeover of environmental regulation was facilitated by the Supreme Court's adoption of a more expansive interpretation of the commerce clause in the wake of the New Deal and continued use of this interpretation by the Warren Court. By the time the Court upheld the constitutionality of the Civil Rights Act of 1964 (*Heart of Atlanta Motel Inc. v. United States*, 379 U.S. 241 [1964]; *Katzenbach v. McClung*, 379 U.S. 294 [1964]), it was clear that the federal government had all the constitutional authority, if not necessarily the economic justification, it needed to regulate even local sources of air pollution (Futrell 1993).[45]

The 1970 Clean Air Act does not expressly assert federal, state, or other public ownership of the atmosphere; nor does it make explicit reference to any public "right"

[43] Technically, they were amendments to the 1955 Clean Air Act (as amended in 1963), which was not a regulatory statute. In reality, the 1970 Clean Air Act started a whole new ballgame. For that reason, the statute is referred to as the "Clean Air Act," rather than "the Clean Air Act Amendments," in the remainder of this chapter.

[44] The Clean Air Act is premised (in conception more than in reality) on a notion of cooperative federalism, according to which state and federal governments each supposedly play important and complementary roles in the regulatory regime. In the 1970 act, the federal government was to establish uniform, national air-quality standards, and the states were left with primary responsibility to control emissions from existing stationary sources of air pollution within their respective boundaries to meet those standards. However, new and substantially modified stationary sources, as well as mobile sources, had to meet federal, rather than state-set, emissions standards. Each time Congress has amended the act since 1970 (especially in 1977 and 1990), federal authority has been expanded at the expense of state authority. Today, state governments are relegated, more or less and for better or worse, to serving as functionaries of the federal EPA. Perhaps the only reason that the states do not rebel and resign their commissions is fear that the EPA might impose draconian measures if required to promulgate federal implementation plans, which are provided for in 42 U.S.C. § 7410(c), for air-quality-control regions in states that decline to prepare state implementation plans.

[45] The chief economic justification for federal intervention in environmental regulation was the problem of interstate pollution, which individual states were unlikely to resolve alone. For example, the State of Illinois would not likely take action against a Chicago-based pollution source whose emissions caused damage only in neighboring Indiana. Even some scholars who believe that the federal government has seized too much regulatory authority over pollution control, relative to the states, accept this argument (Butler and Macey 1996). Another, more controversial, justification for federal intervention was the belief that state competition for economic development would precipitate a "race to the bottom" in environmental standards (Stewart 1985, 919). Whether such a race to the bottom actually occurred or was ever likely to occur has been a source of still-unresolved disagreement among academics (Engel 1997; Engel and Saleska 1998; Revesz 1992; 2001). Another, sometimes overlooked, but very important factor in the federalization of environmental law was concern among interstate industries about the proliferation of varying environmental standards in dozens of states. As Lazarus (2004) notes, in 1967 alone, state governments enacted 112 pollution-control laws, which were neither well coordinated nor necessarily consistent. In these circumstances, "the possibility of a uniform, federal preemptive standard became increasingly attractive to those in the regulated community" (Lazarus 2004, 45; also see Smith [2000]). This public choice explanation of federalization is, to some extent at least, at odds with the race-to-the-bottom hypothesis.

to clean air.[46] In what way, then, does it create public, common, or private property rights (and corresponding duties) with respect to the atmosphere? It does so simply through the sovereign act (under the police power) of regulating access to and use of the atmosphere by polluters. More specifically, it imposes enforceable duties on polluters to not pollute beyond certain levels along with corresponding public rights, which can be exercised by federal or state government agencies, citizens' groups, or private individuals. Like most federal environmental statutes, the Clean Air Act contains a "citizen suit" provision in § 304 (42 U.S.C. § 7604), which provides that "any person may commence a civil action on his own behalf . . . against any other person . . . who is alleged to have violated . . . an emission standard or limitation" under the act. All persons are potential enforcers of the rights to clean(er) air created by the Clean Air Act. That the rights created in the Clean Air Act are contingent and changeable by statutory amendment hardly distinguishes them from other kinds of property, which can be sliced and diced (and resliced and rediced) in all kinds of ways under common-law rules. Those rules expressly recognize, for example, conditional and contingent fee interests (e.g., fee simple determinable, fee simple subject to a condition subsequent, and determinable life estate), not to mention legal rules governing trusts and simple contracts, which are almost completely malleable.[47] More generally, common-law court rulings governing property relations can alter both the quantum and distribution of property rights after the initial assignment (Cribbet 1986).

A simple thought experiment illustrates the property-like effect of the Clean Air Act's regulatory regime. Suppose, counterfactually, that before the Clean Air Act was enacted, there was no pollution regulation of any kind, including common-law restrictions, at any level of government. In that circumstance, the atmosphere would be a nonproperty/open-access resource. Everyone would, in Hohfeld's (1913; 1917) terminology, have a "privilege" or "immunity" (but no "right") to pollute; and no one would possess a "right" to any quantum of clean air. The atmosphere would truly be a pollution sink "open to all" (Hardin 1968, 1244). Suppose that this situation prevailed just before the federal government enacted the Clean Air Act, which restricts access to and use of the atmosphere (for pollution purposes). In Hardin's (1968) schema, the regulation would amount to a regulatory or socialist solution to the "tragedy of the commons," as opposed to the capitalist, privatization solution. The argument here is that the distinction between Hardin's two solutions is not a difference in kind because both solutions create property rights and duties (or something functionally identical to property rights and duties) in the atmosphere. Where previously no one had any duty not to pollute, and no one had the right to prevent anyone else from polluting, after the regulation, polluters have a duty not to pollute the public atmosphere beyond legal limits (set by the government), and government officials and private citizens both have rights to enforce those duties

[46] By contrast, the 1972 Clean Water Act expressly declares as its "objective" the restoration and maintenance of the "chemical, physical, and biological integrity of the *Nation's waters*" (33 U.S.C. § 1251[a]) (emphasis added) and declares unlawful the "discharge of any pollutant by any person" except in accordance with federal permits granted by the EPA (33 U.S.C. §§ 1311[a], 1342).

[47] On defeasible fees and other contingent property interests, see Dukeminier et al. (2006). On the malleability of legal instruments assigning property interests, see Grey (1980). But Merrill and Smith (2001) argue that property rights, properly conceived, are not nearly as malleable as most contemporary scholars suppose.

against polluters. In other words, the Clean Air Act by necessary implication has created rights to a minimal level of clean air, as specified in the act and subsidiary regulations.

Relaxing the assumptions of this thought experiment complicates, but does not fundamentally alter, the picture. In reality, the common law, as well as earlier state and local government regulations, constrained access to and use of the atmosphere as a pollution sink (at least to some extent) before the federal Clean Air Act. Nevertheless, the Clean Air Act allocated (or reallocated) rights and duties with respect to the atmosphere that meet the strict Hohfeldian definition provided by Cole and Ostrom (chapter 2 in this volume).

Partial Privatization of the Atmosphere for Use as a Pollution Sink

The federal government, having asserted a public ownership interest in the atmosphere for purposes of limiting pollution, initially left polluters at liberty to emit pollutants within (changeable) legal limits. There was as yet no "right" to pollute;[48] at most, polluters possessed "privileges" to emit or limited "immunities" from liability for lawful levels of pollution.[49] Such entitlements are not different in kind from the privilege to emit under common-law nuisance doctrine, which enforces only property rights to be free of "unreasonable" pollution.

In the 1990 Clean Air Act Amendments, the federal government made another important institutional move that again altered property relations between air polluters and others with respect to the atmosphere. In a new effort to control sulfur dioxide emissions from power plants in order to reduce the incidence of acid rain,[50] Congress enacted an emissions-trading program that in effect, despite express congressional claims to the contrary, established limited private rights to pollute. Because earlier regulations had converted the open-access atmosphere to some ill-defined form of public property, the Acid Rain Program converted a small amount of that public property to private ownership.

Here is how it worked. The government (1) set an overall pollution-control goal, expressed in terms of overall ambient concentration levels of sulfur dioxide in the atmosphere; (2) determined how much existing emissions had to be reduced to

[48] It would be inaccurate to claim that polluters had even a limited "right" to emit within lawful limits because (1) those limits were changeable and therefore were not enforceable against the government, and (2) even pollution emissions that were lawful under the Clean Air Act might still be unlawful under private or public nuisance law. Compliance with air-pollution regulations is not, generally speaking, a defense against common-law claims (*Orchard View Farms, Inc. v. Martin Marietta Aluminum, Inc.*, 500 F. Supp. 984 [D.Or. 1980]; *Borland v. Sanders Lead Co.*, 369 So. 2d 523 [Ala. 1979]; *Galaxy Carpet Mills, Inc. v. Massengill*, 338 S.E. 2d 428 [Ga. 1986]; *Maryland Heights Leasing, Inc. v. Mallinckrodt, Inc.*, 706 S.W. 2d 218 [Mo. Ct. App. 1986]).

[49] Even this immunity was imperfect, however, because the federal regulatory regime did not preempt common-law actions, which could be used to impose stricter limits on emissions if they were necessary to vindicate the property rights of injured neighbors (Rogers 1994). Also, the Clean Air Act specifies that states may impose stricter limits on emissions than the minimal federal standards (42 U.S.C. § 7416). No state has yet done so, perhaps because the federal floor is already set very high, pursuant to the statutory mandate requiring that national ambient air-quality standards be set to protect the health of the most sensitive subgroups within the population with "an adequate margin of safety" (42 U.S.C. § 7409[b][1]).

[50] Acid precipitation occurs when sulfur molecules recombine in the atmosphere with oxygen molecules and then fall to earth, where the acid has various deleterious effects, including eroding structures, corroding cars and other metallic objects, burning forests, and acidifying water bodies (Likens and Bormann 1974).

meet that goal; (3) subtracted necessary emissions reductions from current emissions to determine an overall quota limit; and (4) unitized and allocated quota limits for each regulated facility, based on the historic emissions rates of each facility (42 U.S.C. § 7651c[e]).[51] The sum of all plants' quota limits was supposed to match the maximum emissions level that would meet the government's overall air-quality goal. If the government's calculations were correct, the pollution-control goal would be achieved if each regulated facility complied with its quota, regardless of emissions trading.

At this point, all the government had done was to create a traditional form of environmental regulation known as a "performance standard" (Cole and Grossman 2005, 332). What made the Acid Rain Program novel, and not just another performance-based regulatory regime, was Congress's express authorization for regulated facilities to buy and sell units of emissions, known as "allowances" (with each allowance equaling one ton of sulfur dioxide emissions), on the open market.[52] The primary purpose of allowance trading was not to achieve the government's emission-reduction goal—that was already more or less guaranteed by the aggregate quota—but to minimize the compliance costs for regulated facilities. According to the theory of emissions trading first analyzed by J. H. Dales (1968), emissions trading improves the economic efficiency of a regulatory regime because it (1) implicitly recognizes that different firms have different compliance cost structures; and (2) uses the market to reallocate the emission-reduction burden to those regulated facilities that can reduce emissions at the least cost.

> Firms with low pollution control costs may find it worthwhile to reduce their emissions below mandated levels, leaving them with excess rights to sell to firms with higher pollution control costs. In theory, exchanges of pollution rights should occur at any price below the marginal pollution reduction costs of some firms and above the marginal pollution control costs of others. As a result of these exchanges, firms with the lowest costs of control should end up taking on the biggest emissions reduction burden, thereby minimizing the overall compliance/abatement costs of attaining the government's pollution control goal. (Cole 2002, 47)

Firms with higher costs of control will not be forced to reduce their emissions as much, but they will have to pay for the privilege of emitting above their initial quotas.[53]

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[51] Various other distributional criteria were available. Instead of allocating allowances based on historical emissions from each source, the government might have chosen to split the overall quota evenly among all 110 of the originally regulated power plants, or it might have allocated more credits to those plants that had taken earlier steps to reduce emissions (as a reward). Such distribution choices can potentially affect the overall cost savings associated with an emissions-trading regime.

[52] It was not entirely novel. Congress, the EPA, and the states had previously experimented with various forms of emissions (or pollution-content) trading. However, the Acid Rain Program was an experiment in emissions trading on a much larger scale (Cole 2002).

[53] It is sometimes inaccurately presumed, including by J. H. Dales, the economist who first developed the idea of emissions trading, that emissions trading minimizes the "total costs to society" of a pollution-control regime (Dales 1968, 107). As Cole and Grossman (1999; 2002) have explained, the total costs of environmental protection equal the sum of compliance/abatement costs, administrative costs (including monitoring and enforcement), and residual pollution costs. Emissions trading results in total cost savings only if the other costs of pollution control are lower than or the same as those of other regulatory regimes. It is sometimes the case, however, that emissions-trading regimes entail higher administrative costs than traditional forms of regulation, such as technology-based standards (Cole and Grossman 1999). If and when those higher administrative costs offset, or more than offset, the lower compliance costs associated with emissions trading, emissions trading cannot be said to minimize total costs.

The Acid Rain Program was, by all accounts, highly successful, leading to emissions reductions that were greater than expected at costs that were not only lower than expected but much lower than under a traditional regulatory system using design or performance standards (Burtraw et al. 1997; Ellerman et al. 2005; Percival, Miller, and Schroder 1996).[54] For current purposes, however, the most important aspect of the Acid Rain Program is its effect on property rights and duties in the atmosphere.

In effect, the Acid Rain Program converted some of the public's property in the atmosphere (which had been converted from open access to public property pursuant to earlier regulations) into limited private rights to pollute, with corresponding duties on others not to interfere with those permitted pollution emissions. Put differently, the Acid Rain Program took what had previously been only a privilege to pollute (or immunity from liability for pollution) and converted it into a bona fide right. And it did so despite Congress's express disclaimer that an emissions allowance is only a "limited authorization" that does "not constitute a property right" (42 U.S.C. § 7651b[f]). The statutory assertion that emissions allowances are not property rights is simply incorrect, or at least overbroad.[55] But how can the law itself be wrong about the legal status of emissions allowances?

Congress made a simple conceptual error—or what the philosopher Gilbert Ryle would have labeled a "category mistake" (1949, 16)—in presuming that it had to declare emissions allowances nonproperty in order to insulate the EPA against takings claims for future regulatory decisions that might reduce the number of allowances in circulation (e.g., to ensure attainment of national environmental goals). Perusal of the legislative history makes clear that all Congress really meant to say is that emissions allowances are not property enforceable against the government (Dennis 1992–1993); no evidence exists that Congress intended emissions allowances to be unenforceable against anyone else. As Cole has explained, Congress's assertion that emissions allowances are not property is "premised on a typical confusion between property rights in something and the thing itself. An emissions allowance is not a property right, but there certainly are property rights in emissions allowances. A utility that holds an allowance to emit SO_2 cannot prevent the government from confiscating it but certainly can exclude all others from interfering with it. The rights to possess and exclude certainly are property rights in allowances" (2002, 54).

That possessory rights in emissions allowances are enforceable as property is clear from actual litigation over disputed possession. In *Ormet Primary Aluminum Corporation v. Ohio Power Co*, 207 F.3d 687 (4th Cir. 2000), the plaintiff claimed an 89 percent proportionate share of emissions allowances allocated under the Acid Rain Program to the defendant's power plant, based on a long-term contractual

[54] The success of the Acid Rain Program is not attributable to emissions trading alone, but to the combination of emissions trading with strict, government-imposed monitoring requirements, specifically, the installation of continuous emissions monitors, reporting in real time to EPA headquarters, at each regulated power plant (42 U.S.C. § 7651k). In the absence of accurate, reliable, and cost-effective monitoring technologies, the program would never have gotten off the ground because emissions sources could not have been held accountable for actual emissions (Cole and Grossman 2005).

[55] Rose tacitly agrees, referring to transferable emissions allowances as "regulatory property," but without a substantial discussion of their status as property (2002, 233).

relationship with the owner of the power plant, of which it is the primary customer (under 42 U.S.C. § 7651g[i], which provides for distribution of allowances among coowners of regulated facilities). The court rejected the claim, finding that the plaintiff's contracts with the defendant did not establish the plaintiff as a joint owner of the regulated power plants pursuant to the requirements of the act. Although the court was careful not to discuss disputed possession of emissions allowances in terms of property ownership, the case was nevertheless about possessory rights in emissions allowances. In other words, it was about the allocation of property between rival claimants.[56] Once again, however Congress might define "emission allowances," they still function as property.

The fact that not every single right is included in a particular owner's bundle of rights—in the case of emissions allowances, the right against uncompensated government expropriation is missing—hardly means that the owner has no property rights at all.[57] If that were the case, the only legally recognized property rights would amount to fee simple absolute.[58] But the law has for many centuries recognized lesser (that is, incomplete) ownership interests in land and other things. Land held in joint tenancy is not freely heritable. Life tenants do not have the right to use land in such a way as to destroy its value to remaindermen (those who take after the life estate ends), under the doctrine of waste. Owners of land that is fee simple determinable can lose their title if they put the land to a use that violates a condition on the fee. All of these are cases of incomplete ownership, in which some typical ownership right is missing or only weakly present, but they are all well-recognized forms of property ownership, even if they are economically less valuable than fee simple absolute.

That emissions allowances under the Clean Air Act may be devalued or even expropriated by the government without compensation hardly means that they do not amount to property (regardless of what Congress says). By creating and allocating emissions allowances, Congress has, in effect, partially privatized the atmosphere, creating very real rights for power plants to pollute that cannot be defeated by the competing claims of a right to clean air. In fact, those competing claimants have a legally enforceable duty not to interfere with emissions of regulated power plants in compliance with their emissions quotas. No one other than the government can stop the power plants from emitting within (changeable) quota limits. Just like the Supreme Court in *Causby*, the U.S. Congress in the 1990 Clean Air Amendments created a mixed property system in the atmosphere, recognizing a combination of private and public property rights. If anything, the boundaries between the publicly owned and privately owned parts of the atmosphere are better

[56] For a similar case, see *City of Owensboro v. Kentucky Utils. Co.*, 2008 U.S. Dist. LEXIS 68587 (W.D. Ky. 2008).

[57] Were freedom from uncompensated government expropriation the sine qua non of property, no such thing as property would exist, technically speaking, in the United Kingdom, where no constitutional right to compensation for government takings exists, although Parliament regularly offers compensation as a matter of statutory law and "convention" (Cole 2007, 154–155).

[58] "Fee simple absolute" is the law's technical phrase for ownership of a complete bundle of property rights, including right to exclusive possession, use and enjoyment, alienation, and so on, without any conditions or contingencies other than common-law nuisance restrictions, zoning and other valid police power restrictions, the possibility of adverse possession, or compensable taking by the government. As these exceptions indicate, fee simple absolute ownership turns out to be far from absolute.

defined in the Clean Air Act than in the case of liability for airplane overflights under *Causby*.

Unresolved Normative Issues

This chapter's thesis of property creation by regulation applies not only to the atmosphere, but also to other natural resources, including marine fisheries, where property rights have been created by similar acts of sovereignty. The regulatory establishment of individual transferable quotas (ITQs) in fisheries is closely analogous to the creation of emissions allowances in air pollution.[59] They amount to private property rights in otherwise public fisheries. The fisheries are public, rather than open-access, resources in the first place because governments long ago claimed public property rights by assertions of sovereignty, including the declaration of exclusive economic zones extending two hundred miles from shore.[60] As Barnes explains, "Exclusive competence over a geographically determinate zone is the crucial prerequisite to the establishment of property rights in marine natural resources" (2009, 311). The assertion of sovereignty is critical because marine resources are plagued by a "problem of physical excludability," which can only be "overcome through the use of positive law to assert legal excludability" (Barnes 2009, 252). Once sovereign rights, that is, public property rights, were in place, governments could allocate limited private property rights to improve efficient, partly market-based resource management.[61]

If, as has been argued, regulatory regimes and other acts of sovereignty sometimes create and vindicate public and private property rights, as well as restrict them, the next step is to address the significance of that observation. Two related implications of this argument highlight its importance.

As noted earlier, regulatory takings doctrine is premised on theories of property according to which regulations are essentially impositions on private property rights, rather than assertions or attempts to vindicate existing public or private property rights. Consequently, even in several takings cases where privately owned lands have abutted publicly owned waters, the Supreme Court has (at least until very recently) focused exclusively on the private rights at issue to the detriment of real, existing public rights (Cole 2002: ch. 8). The arguments in this chapter raise important questions about the meaning, scope, and doctrine of regulatory takings, including its theoretical underpinnings.

Among the most important of those questions is whether private property rights should trump conflicting public property rights (or vice versa) in regulatory takings

[59] On the history of property rights in fisheries, from open access to ITQs, see Scott (2008). Macinko and Bromley (2004) deny that ITQs constitute property rights because one fisherman cannot enforce a quota limit against another. They seem to confuse the ITQ holder's private right to take fish, which is clearly a property right enforceable against those who might interfere with the ITQ holder's efforts to take fish within the quota limit, with the ITQ holder's duty not to take fish beyond the quota limit, which is enforceable not by other private individuals, but by the state. The fact that the ITQ holder's duty is enforceable only by a government agency merely confirms that the property right that corresponds to that duty is a public property right rather than a private property right.

[60] Historically, these assertions of sovereignty were not intended primarily to facilitate fisheries conservation, but to control exploration for valuable offshore mineral deposits (Barnes 2009).

[61] Heller (1999) observes that regulations establishing ITQs create, rather than destroy, private property.

disputes. Before that question can reasonably be answered, more work needs to be done on the development of a theory (or multiple theories) of public property that goes beyond existing, almost equally naïve, public interest and public choice models. These theories are needed to complement the numerous, well-developed theories and studies of private property that already exist. Even common property, thanks to the work of Ostrom (1990) and others, has been more rigorously studied in recent years than has public property. Therefore, this chapter ends with a general call for more legal and social scientific research on the theory and empirics of *res publicae*, particularly as it interrelates with other property systems.

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