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# Ecosystem Services and the Common Law of “The Fragile Land System”

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J.B. Ruhl

The standard history of environmental law goes something like this: First there was the common law of nuisance. It worked alright for awhile at curtailing noxious uses of land, but over time things got pretty complicated with the rise of cities, industries, and all that. Earth Day and Rachel Carson awakened us to the ravages of pollution in an industrialized society, but by then the courts had thrown up their hands, claiming it was all too much for the common law to handle. State and local governments were busy racing to somewhere called “the bottom” and did not have time for legislative fixes, so the wise and mighty federal government took command by enacting a horde of laws designed to stop pollution and clean up the mistakes of the past. These laws worked like a charm for a good while, until things got even more complicated. We began to understand the breadth and depth of our impact on ecosystems and the landscape, and to appreciate how puny the federal laws seemed in comparison to the magnitude of large-scale ecological degradation. At the same time, landowners had gotten awfully riled up over all the rules and regulations, and said they could not stand any more of it. Thankfully, along came the second generation of environmental laws, with smart new ideas like pollutant trading, negotiated permits, and environmental management systems. And we all lived happily ever after.

I am joking, of course. Or am I? Rest assured that you could find plenty of support in law books and journal articles for this account, and just as high a stack of literature calling it bunk. But one entry finds almost universal support—that the source, the very backbone of the wave of federal pollution control laws the federal government enacted in the 1970s, was the common law of nuisance. And many observers also agree that there has been a profound shift of emphasis in environmental policy from controlling smokestacks and discharge pipes to managing ecosystemwide phenomena such as habitat loss, invasive species, and nutrient-laden runoff—what today goes under the umbrella term of ecosystem management.

What is missing from this more recent focus on ecosystems and their sensitivity to human insult, however, is any notion that legislative initiatives might find some guidance in the framework of the common law. How is it that the common law of nuisance is regarded as the genesis of pollution control law, but for the law of ecosystem man-

agement it is as if the common law never happened? In fact, the more frequent prognosis is worse than that—it suggests that the common law simply *cannot* be a factor in shaping the law of ecosystem management.

For example, in *Lucas v. South Carolina Coastal Commission*, 505 U.S. 1003 (1992), Justice Scalia announced the majority’s ruling that where a new regulation denies all economically beneficial or productive use of land—in that case a blanket prohibition of development in coastal dune areas—it must be treated as a *per se* taking of property for which just compensation is due under the Fifth Amendment. Justice Scalia’s caveat was that just compensation would not be due if the regulation does no more than simply “duplicate the result that could have been achieved in the courts—by adjacent landowners (or other uniquely affected persons) under the State’s law of private nuisance, or by the State under its complementary power to abate nuisances that affect the public generally.” *Id.* at 1029. In his concurring opinion, Justice Kennedy expressed concern with the idea that state regulation could go no further than duplicating the common law of nuisance without exposing itself to the now infamous “categorical taking” problem, for as he put it, “[c]oastal property may present such unique concerns for a fragile land system that the State can go further in regulating its development and use than the common law of nuisance *might otherwise permit.*” *Id.* at 1035 (emphasis added). In other words, Justice Kennedy took it as a given, as Justice Scalia and the majority also clearly did, that the common law could not reach the “fragile land system.” Indeed, although leaving the final say to state courts, Justice Scalia surmised that “it seems unlikely that common-law principles would have prevented erection of any habitable or productive improvements on petitioner’s land.” *Id.* at 1031. But why not?

This article explores that question through a posited evolution of the common law that is both radical and mundane. It is radical in the sense that it challenges the deeply rooted idea that the common law has no place in the law and policy of ecosystem management. It is mundane in the sense that the common law doctrine proposed to fill the gap is quite ordinary—the law of nuisance. At bottom, therefore, it is about economic injury, not the environment at large. It is not a charter for courts to police the nation’s biodiversity, or to restore what we believe to be some past state of nature, or to devise and enforce broad personal rights in environmental quality. Indeed, being based on the law of nuisance, it is grounded in terms and concepts so familiar in the common law as to appear quite plain vanilla.

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The first part of the article describes the arguments usually advanced for why the common law has not or cannot extend its reach to include the domain of the fragile land system. The next part explores the advances in knowledge about the management of ecosystem dynamics that point to a severe policy failure on the horizon, and discusses reasons why legislation has not effectively filled the void. The final section outlines an evolution in nuisance law based on emerging knowledge about the economic value humans derive from healthily functioning ecosystems—what ecologists call “ecosystem services.” Though based on a straightforward application of nuisance law, the incremental development I am proposing for the law could jumpstart another evolution of environmental law, this time based in the common law and devoted to rectifying ecosystem-level harms.

### *The Common Law and Ecosystem Management*

Several explanations have been advanced for why the common law seems virtually irrelevant, if not impotent, in the developing policy dialogue of ecosystem management. The first, a “lack of capacity” argument, posits that the common law is inherently inept at addressing questions of ecosystem management. Nuisance law may have worked well enough for controlling pollution for a while, but there is just something about protecting ecosystems, goes the argument, that puts it outside the domain of the common law. Under this view, it is a waste of time to even think about how the common law can contribute to ecosystem management.

Evidence for this view is found in none other than the history of nuisance law in the pollution control context. Almost a century ago the U.S. Supreme Court decision in *Georgia v. Tennessee Copper Co.*, 206 U.S. 230 (1907), suggested that the common law could play an important and innovative role in pollution control. After agricultural landowners were unsuccessful in stopping harmful air emissions from copper smelting plants in eastern Tennessee, see *Madison v. Ducktown Sulphur Copper & Iron Co.*, 113 Tenn. 331, 83 S.W. 658 (1904), Georgia’s public nuisance claim against the Tennessee companies fell on sympathetic ears in the Supreme Court. The Court was “satisfied by a preponderance of the evidence that the sulphurous fumes cause and threaten damage on so considerable a scale to the forests and vegetable life, if not to health, within the plaintiff State” as to justify an injunction. 206 U.S. at 238–39. Indeed, in a later remedial decree, see 237 U.S. 474 (1915), the Court, much like a modern administrative agency, required the company to

keep daily records of its operations, to submit to court-appointed inspectors, to meet performance standards for emission rates, and to comply with maximum total daily emission loads. Although the Court later relaxed some of the limits during wartime, ultimately the case had a technology-forcing effect as the fear of liability led the industry to develop a new smelting process that allowed reclamation of the sulfur. See ROBERT PERCIVAL ET AL., ENVIRONMENTAL REGULATION 82–84 (4th ed. 2003). If the common law can produce this kind of result, who needs legislation?

But confidence in the common law eventually waned. The death knell to this sort of hopeful thinking came in the famous case of *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 257 N.E.2d 870 (1970), in which New York’s highest court declined to enjoin a cement plant’s air emissions, ruling instead that a damages remedy, previously not available under New York law, was the more efficient approach. While known mostly for that shift in remedial doctrine, the court’s rationale for backing off injunctive relief sent a loud message to legislatures that their help was needed:

A court performs its essential function when it decides the rights of parties before it. Its decision of private controversies may sometimes greatly affect public issues. Large questions of law are often resolved by the manner in which private litigation is decided. But this is normally an incident to the court’s main function to settle contro-

versy. It is a rare exercise of judicial power to use a decision in private litigation as a purposeful mechanism to achieve direct public objectives greatly beyond the rights and interests before the court.

Effective control of air pollution is a problem presently far from solution even with the full public and financial powers of government. In large measure adequate technical procedures are yet to be developed and some that appear possible may be economically impracticable.

It seems apparent that the amelioration of air pollution will depend on technical research in great depth; on a carefully balanced consideration of the economic impact of close regulation; and of the actual effect on public health. It is likely to require massive public expenditure and to demand more than any local community can accomplish and to depend on regional and interstate controls.

A court should not try to do this on its own as a by-product of private litigation and it seems manifest that the judicial establishment is neither equipped in the limited nature of any judgment it can pronounce nor prepared to

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lay down and implement an effective policy for the elimination of air pollution. This is an area beyond the circumference of one private lawsuit. It is a direct responsibility for government and should not thus be undertaken as an incident to solving a dispute between property owners. . .

257 N.E.2d at 871. The date of the opinion, not coincidentally, marks the advent of the wave of federal legislation regulating air, water, and land pollution. So it is no surprise that law students are taught today that “there is wide agreement that private nuisance actions alone are grossly inadequate for resolving the more typical pollution problems faced by modern industrialized societies.” PERCIVAL, at 72. Replace “pollution” in that sentence with “ecosystem management” and one has the lack of capacity argument in a nutshell.

The second explanation, the “lack of opportunity” argument, posits that the common law certainly could have developed principles governing the use and abuse of sensitive resources, but for some reason the stars did not align in such a way as to present the opportunity. Under this view, when the shift from pollution control to ecosystem management occurred as a matter of policy focus, there simply was no common law tradition on which to draw, and any legislative impetus thus must forge ahead without using common law principles as its backbone. It is too late, in other words, for the common law of ecosystem management to emerge.

This is the explanation often given for the underachievement of the common law’s Public Trust Doctrine. The name is impressive, suggesting great possibilities. But the lodestar case of the Public Trust Doctrine in the United States, at least for purposes of thinking about it as a tool of resource conservation, was no harbinger of ecosystem management. In the U.S. Supreme Court’s 1892 opinion in *Illinois Central Railroad Co. v. Illinois*, 146 U.S. 387 (1892), the Court held merely that Illinois could not sell fee interests in the land under Chicago Harbor to private developers, because

[t]he state holds the title to the lands under the navigable waters. . . . It is a title held in trust for the people of the state that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein, freed from the obstruction or interference of private parties. *Id.* at 452.

Nevertheless, in his landmark 1970 article Professor Joseph Sax outlined an ambitious agenda for evolving the doctrine into the nation’s bedrock source of ecosystem management law. See Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970). Sax argued that “[o]f all the concepts known to American law, only the public trust doctrine seems to have the breadth and substantive content which might make it useful as a tool of general application for citizens seeking to develop a com-

prehensive legal approach to resource management problems.” *Id.* at 474. But this never came to be.

One reason is that the U.S. Supreme Court declined the invitation to take the doctrine there. As far as the Supreme Court is concerned, the states may not alienate fee title in tidelands, shores, and other public trust lands in violation of the Public Trust Doctrine, and that is it. To be sure, many state courts have opined more broadly on the scope of the Public Trust Doctrine. One famous case from California, regarding the diversion of water from Mono Lake, ruled that “[t]he state has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible.” *Nat’l Audubon Soc’y v. Superior Court of Alpine County*, 658 P.2d 709, 728 (Cal. 1983). This and other state cases like it, however, are mindful of the “publicness” of public trust resources, emphasizing uses such as navigation, fishing, and recreation, and not necessarily preservation or even active conservation of ecosystems.

It is true that an occasional state case suggests an ecologically oriented purpose to the doctrine. Perhaps the most noted case in this regard is from Wisconsin, in which the court found that the doctrine required that wetland areas be limited to uses consistent with “natural conditions.” See *Just v. Marinette County*, 201 N.W. 2d 761 (Wis. 1972). Several more recent cases are variations on that theme. See, e.g., *Friends of Van Cortland Park v. City of New York*, 750 N.E.2d 1050 (N.Y. 2001) (doctrine covers public parks); *In re Water Permit Applications*, 9 P.3d 409 (Haw. 2000) (doctrine covers groundwater); *Weden v. San Juan County*, 958 P.2d 273, 284 (Wash. 1998) (doctrine regulates personal watercraft on state waters); *Pullen v. Ulmer*, 923 P.2d 54 (Alaska 1996) (doctrine covers fish in their natural state); *Vander Bloemen v. Wisc. Dep’t of Nat. Resources*, 1996 WL 346266 (Wis. Ct. App. 1996) (doctrine protects lakeside ecology); *Aspen Wilderness Workshop, Inc. v. Colo. Water Conservation Bd.*, 901 P.2d 1251 (Colo. 1995) (state must avoid injury to creek from ski resort’s water request); *Selkirk-Priest Basin Ass’n, Inc. v. Idaho ex rel. Andrus*, 899 P.2d 949 (Idaho 1995) (doctrine allows challenge to timber sales on ground that sedimentation could injure fish spawning grounds).

Some commentators thus assert that the Public Trust Doctrine is “definitely growing” as an ecosystem management tool. See Arnold L. Lum, *How Goes the Public Trust Doctrine: Is the Common Law Shaping Environmental Policy?*, NAT. RESOURCES & ENV’T, Fall 2003, at 73. By and large, however, the state courts have declined to mobilize Professor Sax’s vision of the Public Trust Doctrine as a means of effective and broad judicial intervention in resource management policy. There is, simply put, no broad-based ecosystem management duty to be found in the judiciary’s version of the Public Trust Doctrine, certainly not one that could reach private lands on which ecologically important resources are found.

In short, while it may be hard to detect any aversion

in the case law to expanding the Public Trust Doctrine into the domain of ecosystem management, it is even harder to detect any sense of urgency or enthusiasm. One rather obvious possibility for this lethargic approach is that, not long after Professor Sax suggested how its latent power could be tapped, the legislative revolution of the 1970s unfolded to bring one after the other of comprehensive resource management laws into being. New federal legislation protecting wetlands, the coastal zone, and endangered species, as well as managing federal public lands, obviated the need for the Supreme Court to revisit the Public Trust Doctrine, and the eventual blossoming of similar state legislation did the same at the state level. Maybe the Public Trust Doctrine could have become what Professor Sax envisioned in 1970 and what many commentators still hold out hope for, but with the surge of federal and state environmental legislation that transpired, who needed it?

The fact that the common law can fashion innovative remedies, as the history of *Tennessee Copper* suggests, and is still “growing,” as the slow evolution of the Public Trust Doctrine evidences, may support the position that the common law actually does have the capacity and the opportunity to move into the ecosystem management realm. But the final explanation for why it heretofore has not moved on that front, or the “lack of will” argument, is more cynical—that the common law has the capacity to develop a set of ecologically oriented doctrines and has had many opportunities to do so, but simply has no advocates who wish it to move in that direction. Rather, this position contends, common law institutions have deliberately pursued anti-environmental policies to facilitate other interests such as the protection of property rights and promoting economic uses of land.

Evidence for this view was comprehensively assembled by law professor John Sprankling in *The Anti-Wilderness Bias in American Property Law*, 63 U. CHI. L. REV. 519 (1996), in which he systematically surveys property law doctrines such as waste, adverse possession, trespass, and nuisance, and argues that they were and remain “tilted toward wilderness destruction” in order “to encourage the agrarian development” of the nation. *Id.* at 521. He points out, for example, that American law abandoned the British version of the waste doctrine, which banned forest clearing for cultivation, and replaced it with the view that clearing for cultivation was “good husbandry.” *Id.* at 534–35. And American trespass law developed in many states so as to tolerate, if not to endorse, open grazing of livestock on the unenclosed lands of another landowner. *Id.* at 548–49. These and other examples of his thesis, Sprankling argued, flowed from the abundance of wilderness America enjoyed relative to England, the need to build an economy, and the exalted position in which Americans generally place private property

rights. He concluded that, “all other things being equal, the property law system tends to resolve disputes by preferring wilderness destruction to wilderness preservation.” *Id.* at 520.

### *The False Start of Ecosystem Management Legislation*

Even if one subscribes to the view that the common law, for one or another of the reasons outlined above, ran out of gas by the time the proliferation of federal environmental legislation began in the 1970s, it is difficult to deny the important role the common law had in shaping the contours of the pollution control laws. Most comprehensive treatments of the evolution of environmental law begin with the common law as the first meaningful stage of development. See, e.g., E. Donald Elliott et al. *Toward a Theory of Statutory Evolution: The Federalization of Environmental Law*, 1 J. L. ECON. & ORG. 313, 315 (1985). In particular, over time the nuisance doctrine developed into a powerful means of regulating the environment, so much so that

[t]here is no common law doctrine that approaches nuisance in comprehensiveness or detail as a regulator of land use and technological abuse. Nuisance actions reach pollution of all physical media—air, water, land, groundwater—by a wide variety of means. Nuisance actions have challenged virtually every major industrial and municipal activity that today is the subject of comprehensive environmental regulation.

WILLIAM H. RODGERS, ENVIRONMENTAL LAW § 2.1 at 112–13 (2d ed. 1994). Indeed, from the beginning of the twentieth century courts had enjoined the operation of industries found to cause pollution of agricultural land, *Whalen v. Union Bag & Paper Co.*, 208 N.Y. 1, 101 N.E. 805 (1913); enjoined facilities emitting noxious odors, *Costas v. City of Fond Du Lac*, 24 Wis. 2d 409, 129 N.W. 2d 217 (1964); *Steifer v. Kansas City*, 175 Kan. 794, 267 P.2d 474 (1954); and awarded damages against plants found to have polluted waters, *Harrisonville v. W.S. Dickey Clay Mfg. Co.*, 289 U.S. 334 (1933). Clearly, therefore, by the time Congress turned its attention to air, water, and land pollution in the early 1970s, the common law had established the causal connections between pollution and environmental harm, and between environmental harm and economic injury, and endorsed the need for and practical availability of remedies. The common law thus provided much-needed legitimacy to the public law agenda for pollution control.

By contrast, the public law agenda for ecosystem management has no common law roots. In 1993, when Vice President Al Gore’s National Performance Review called for federal agencies to support a “proactive approach to ensuring a sustainable economy and a sustainable environment through ecosystem management,” there was absolutely no foundation from which to begin, common law or otherwise. The case could have been made that the initiative would be an extension of the Endangered Species Act (ESA), which,

after all, proclaims that it is intended to “provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.” 16 U.S.C. § 1531(b) (2004). But the ESA hardly enjoys broad-based legitimacy—it remains one of the most controversial of environmental laws—and in fact its provisions make for a rather clumsy ecosystem management framework. See J.B. Ruhl, *Ecosystem Management, the Endangered Species Act, and the Seven Degrees of Relevance*, 14 NAT. RESOURCES & ENV’T 156 (2000). Ecosystem management, in other words, was left to building itself from the ground up.

At about the same time, our knowledge of ecosystem dynamics and the fragility of some natural resource systems began growing by leaps and bounds, making the case for an ecosystem management initiative quite compelling. The landmark contributions in the field appeared in the mid-1990s, defining the basis and framework for ecosystem-scale management of natural resources. See Norman L.

Christensen et al., *The Report for the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*, 6 ECOLOGICAL

APPLICATIONS 665 (1996); R. Edward Grumbine, *What Is Ecosystem Management?*, 8 CONSERVATION

BIOLOGY 27 (1994). For my purposes, however, the most important development was the emergence of a branch of ecosystem management focused on the economic value humans derive not from natural resource commodities such as timber, or from recreational uses, but from ecosystem functions such as flood control, pollination, thermal regulation, and storm surge mitigation—what ecologists today call ecosystem services. See NATURE’S

SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS (Gretchen Daily ed., 1997). Through enhanced understanding of ecosystem service values associated with natural resources, the case for ecosystem management took on a previously unnoticed economic dimension. And, given the relation between intact ecosystems and the delivery of these economically important services—in essence, the ecosystem resources are the natural capital necessary for production of the services—it seemed to me and a few other lawyers at the time that the law ought to pay attention to whether ecosystems are being properly managed to enhance overall social wealth. See James Salzman, *Valuing Ecosystem Services*, 24 ECOLOGY L. Q. 887 (1997); J.B. Ruhl, *Valuing Nature’s Services—The Future of Environmental Law?*, 13 NAT. RESOURCES & ENV’T 359 (1998).

Yet public legislation, so effective at combating pollution of air, water, and land, is faltering at the prospect of forming a coherent ecosystem management regime, much less one with any focus on ecosystem service values. In the ten plus years since Vice President Gore began the ecosystem management

initiative, not much concrete has happened. Federal agencies, particularly the public land management agencies, scrambled around for several years pronouncing their commitment to the cause, thereby striking fear into the hearts of western land interests. See Rebecca W. Thompson, “*Ecosystem Management*”—*Great Idea, but What Is It, Will It Work, and Who Will Pay for It?*, NAT. RESOURCES & ENV’T, Winter 1995, at 42. Congress managed no more than to introduce a bill, the Ecosystem Management Act of 1995, which did not even define ecosystem management! See S. 2189, 104th Cong., 1st Sess. (1995) (requiring an appointed commission to study the question of how to define ecosystem management). Indeed, in a law school casebook, I had to conclude that, at best, “the ESA and a collection of other laws contain elements and programs that can explicitly or impliedly be advanced toward developing ecosystem-level policies designed to conserve biodiversity.” JOHN NAGLE & J.B. RUHL, *THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT* 297–98 (2002).

For example, EPA has pronounced its adoption of a “watershed approach,” but by this the agency means a concerted effort to use watershed-based ecosystem management principles to guide implementation of a broad array of authorities. See Memorandum from G. Tracy Meehan, III, Assistant Administrator to Office Directors, Re: Committing EPA’s Water Programs to Advancing the Watershed Approach (Dec. 3, 2002). EPA has no true watershed-based statute to administer. In short, ecosystem management law is a cobbled-together body of law, if it can even be called that much.

Ecosystem management finds itself in this fragmented and stalled condition because, unlike the antipollution legislation, it had no common law foundation on which to build its structure and legitimacy. Perhaps out of arrogance, or ignorance, or the failure fully to appreciate the importance of the common law to antipollution legislation, ecosystem management legislation tried to leapfrog its common law formative stage, and it has gained little traction as a result. The question is whether the common law can overcome its reputation as having little meaningful to add to the field and backfill a foundation for the public law of ecosystem management. There is a basis for hope in this regard.

### *The Common Law of Ecosystem Services*

If any of the “lack of” arguments about the common law ever did provide explanatory power for understanding the state of the common law of ecosystem management in the past, it retains none today. Rather, the common law has the capacity, opportunity, and, I daresay, the present-day will to become an engine of ecological intelligence within our legal system.

Each of the three arguments for explaining the absence of

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a common law of ecosystem management, supported as they are by solid evidence in the case law, nonetheless suffers from the same problem—each depends on conditions exogenous to the common law, conditions that themselves evolve and thus may over time alter whatever constraint they imposed on the development of the common law in the past. In particular, each of the arguments ignores our increasing base of knowledge about ecosystem dynamics and the immense economic value of the ecosystem services they provide, knowledge which, through its continuing development, could substantially alter the calculus of the common law.

Many commentators before me have advanced the cause that the common law is profoundly adaptive. See J.B. Ruhl, *Complexity Theory as a Paradigm for the Dynamical Law-and-Society System*, 45 DUKE L.J. 849, 916–20 (1996). It may very well be that nuisance law was overwhelmed by industrial society, that the Public Trust Doctrine was eclipsed by federal legislation, and that property law was heavily influenced by our nation's boundless frontier mentality, but all those conditions have changed. We know industrialization has harmed our ecosystems, that federal legislation does not hold all the answers, and that the ecological frontier, if anything, is vanishing. And we know much more today than we did thirty years ago about ecosystem services. As Justice Scalia acknowledged in *Lucas*, “changed circumstances or new knowledge may make what was previously permissible [under common law] no longer so.” 505 U.S. at 1031 (emphasis added). Hence, there is no reason why the common law cannot make an adaptive move to fill some of the gap in ecosystem management which, as discussed in the previous section, federal legislation has left open and is not likely to fill without help.

So, what would be the organizing principles for the evolution of a common law doctrine of ecosystem management? It is too easy to propose that the common law simply reverse direction and place a “green thumb on the scales of justice” in favor of protecting ecosystems in general. See, e.g., Sprankling, 63 U. CHI. L. REV. at 587–89. Nor will it be as easy as simply pointing out the objectives of ecosystem management and inviting the common law to have at it. There has to be a concrete theme to motivate the interest and action of private litigants and the courts, and that theme must have dimensions fitting within the basic contours of common law doctrine and institutions. This includes articulating a coherent statement of rights and liabilities that are susceptible to analysis through commonly understood and applied principles of proof of breach, injury, and causation, as well as a remedial system that provides efficient and equitable outcomes. In other words, the approach has to be legally practical.

Unfortunately, the discipline of ecosystem management is for the most part brimming with themes that are decid-

edly impractical for these purposes. Its organizing principles include conserving biodiversity, restoring naturalness, providing safe harbor for native species, and the implementation technique of adaptive management. Impressive sounding as these terms may be, they are square pegs to the common law's round holes.

By contrast, the ecosystem services branch of ecosystem management holds great promise for the common law. Most of ecosystem management is devoted to keeping ecosystem functions healthy for the sake of ecosystems, whereas the study of ecosystem services is devoted to articulating which ecosystem functions provide service values to humans that would be costly, but clearly necessary or desirable, to replace were they to degrade in quantity or quality. Moreover, because ecosystem services are the product of ecosystem functions, and ecosystem functions are the product of ecosystem structure, it follows as a matter of economic theory that the relevant

ecosystem structure is no less than the natural capital necessary for providing economically valuable services to humans. And this new focus in ecology is producing a rapidly mounting body of research attaching real numbers to ecosystem service values at local and regional scales.

Recently, for example, researchers studying pollination services in Costa Rica demonstrated that the conversion of land from forest to grazing uses reduces the local populations of wild pollinator species enough to diminish productivity of nearby coffee plantations by more than 20 percent, resulting in a loss of \$64,000 annually for a typical plantation. See T.H. Ricketts, *Tropical Forest Fragments Enhance*

*Pollinator Activity in Nearby Coffee Crops*, 18 CONSERVATION BIOLOGY 1262 (2003). On a larger scale, more than twenty years ago law professor Oliver Houck demonstrated that the loss of coastal wetlands in Louisiana was costing the state billions of dollars in lost service values. See Oliver Houck, *Land Loss in Coastal Louisiana: Causes, Consequences, and Remedies*, 58 TULANE L. REV. 3 (1983). The idea took some time to catch on, but Louisiana recently embarked on an “Americas Wetland” campaign to call attention to its vanishing coastal wetlands, including a major push to gain federal assistance by noting the economic consequences of having its “working coastline” of oil rigs, ports, fishing villages, and New Orleans casinos flooded by the combination of rising sea levels and falling coastline levels. See *America's Wetland Campaign*, [www.americaswetland.com](http://www.americaswetland.com). Ecosystem services are not about just birds and bees—they are about money, and lots of it.

Armed with that core set of principles, it is remarkable how straightforward an exercise it is to outline a set of common law rights and liabilities that put ecosystem services into play as the essential fabric of a new stage in the development of environmental common law. Every law student

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learns the black letter doctrine of nuisance: one commits a nuisance when his or her use of land unreasonably interferes with another person's reasonable use and enjoyment of his or her interest in land. Lawyers through the ages have had no problem agreeing that odors from a pigsty, or fumes from a copper smelting plant, or chemical pollution of a lake or stream are within the ballpark of nuisance so defined. Why should matters be any different when one person's use of land severs the flow of economically valuable ecosystem services to another person's use of land?

A thought exercise drawing from the pollination example can help illustrate the spectrum of possibilities suggested: A commercial apple orchard is situated between an industrial facility on one side and a forested tract on the other. The owner of the apple orchard has suffered a substantial decline in commercially marketable apple production and can prove both the cause and the economic damage. The alternative causes to consider are:

- Emissions from the industrial facility drifting into the orchard are damaging the bark of the trees, causing them to decline in productivity.
- Emissions from the industrial facility drifting into the orchard are blemishing the skin of a substantial percentage of the unripe apples, causing them to be unmarketable.
- Emissions from the industrial facility drifting into the orchard leave a residue on the apple tree leaves that interferes with photosynthesis, causing the trees to decline in productivity.
- Emissions from the industrial facility drifting into the orchard are deterring visits from wild pollinators residing in the forest tract habitat, thus causing a reduction in successful fruit production.
- The owner of the forest tract cuts down all the trees to build a shopping mall, eliminating that source of wild pollinator visits and thus causing a reduction in successful fruit production.

The first two of these scenarios are classic fodder for nuisance claims. To be sure, there may be much to resolve for questions of liability and remedy, but these cases are squarely within the tradition of nuisance law. The next two scenarios involve land uses that sever the flow of ecosystem services to the orchard by interrupting the delivery of the service, photosynthesis in one case and pollination in the other. If these causal connections are proven, it is not clear why the common law would fail to recognize them as cognizable causes of action in nuisance if it does recognize the first two scenarios as such. Indeed, while the causes in the first two scenarios are described in familiar terms—damage to tree bark and blemishes on apple skins—in fact the causal chain in those cases is the interruption of ecosystem functions that support the trees and their production of unblemished fruit. Why should it matter that the cause of the reduced fruit production was the chemical reaction of the pollutant on tree bark or apple skin in the first two cases versus its effect on sunlight or bees in the next two? Why treat any of the first four scenarios differently?

The more difficult case is the fifth scenario, because the flow of ecosystem services is severed at the source

property through destruction of the natural capital—the forest supporting the pollinators—rather than at the benefited property through interruption of the service at the point of delivery. But the end result is the same—the orchard produces less fruit. If the orchard owner can prove that the reduced fruit production is the loss of pollinators that once resided on the shopping mall tract, why would that not be cognizable in nuisance?

The quick response might be that the conversion of the source property from forest to shopping mall is not unreasonable, whereas pollution drifting in from the industrial facility is. But that does not answer the question, which was whether the orchard owner's case is *actionable* in nuisance, not whether it would prevail. The termination of pollination is, after all, interfering with the orchard owner's use and enjoyment of the property. That opens the door to a nuisance claim, with the central question being, as it is in most nuisance cases, whether the termination was unreasonable. Nuisance law is quite a thicket on the question of what is unreasonable, but that is both the beauty and the frustration of the common law. It is made for this kind of balancing inquiry, which Justice Scalia described as an "analysis of, among other things, the degree of harm to public lands and resources, or adjacent private property, posed by the [landowner's] proposed activities, the social value of the [landowner's] activities and their suitability to the locality in question, and the relative ease with which the alleged harm can be avoided through measures taken by the [landowner] and the government (or adjacent landowners) alike." 505 U.S. at 1031 (citations omitted).

To be sure, it is not expected that every loss of natural capital should be or would be branded unreasonable under this test. Some natural capital is more critical than most, in that its degradation or destruction leads to significant economic injury on other lands. But given that we increasingly know where natural capital is located, where the ecosystem services it produces flow, and the value of those services at benefited properties, there is no reason why nuisance law in both its public and private stripes could not sort through questions about whether the destruction of natural capital in discrete cases is reasonable or not.

Not far from where I live and teach in Florida, for example, one can see quite palpable evidence of the importance of coastal dunes to the mitigation of hurricane storm surge damage at inland locations. There is a staggering difference in outcome between inland areas shielded by intact dunes and those inland of coastal development that did not retain dunes. On a far more devastating scale, surely the media coverage of Katrina, which repeatedly made the point that damage in New Orleans would have been mitigated had the coastal wetlands not been so severely degraded, has focused the nation's mind on the economic importance of ecosystem services. Under Justice Scalia's version of the nuisance balancing test, the harm to the public resources and private property resulting from the impaired dune and wetland systems unquestionably was severe, likely far outweighing the social utility of development that destroyed the resources, and the owners of prior intact dune and wetland areas

were in the best position to avoid the harm. Were those resources thus critical natural capital, the destruction of which was unreasonable in relation to the expectations of inland property owners whose homes and businesses are now in splinters?

It is my belief that the common law is equipped to answer that question and others like it. The fact that it has not until now attempted to do so does not mean that it cannot, or will not have the opportunity, or simply is against all notion of it. The only missing ingredient until now has been the storehouse of knowledge ecologists and economists are building about the value of ecosystem services. This is precisely the kind of new knowledge Justice Scalia confirmed in *Lucas* can transform the common law and “make what was previously permissible no longer so.” 505 U.S. at 1031. As sovereigns and landowners become aware of this new knowledge and begin to appreciate the cost imposed to them when others sever the flow of ecosystem services to their lands, they *will* sue in public and private nuisance actions. Indeed, such a claim recently was initiated with respect to the losses suffered in Katrina, alleging that those responsible for the disruption of wetland processes are also responsible for the economic losses that followed. See *Barasich v. Columbia Gulf Transmission Co.*, Civ. Act. No. 05-4161 (E.D. La. Complaint filed Sept. 13, 2005). And when lawyers and experts use this new knowledge to demonstrate to courts the cause of the injury and the value of the services lost, the courts *will* award damages, injunctions, and other relief. And it will all seem quite mundane because there will be nothing about it that is out of the ordinary for the common law.

### *A Renaissance in Environmental Common Law, One Step at a Time*

The evolution of environmental common law outlined here is radical in the sense that it rebuts long-held assumptions about the limits of the common law in the ecological realm, but it is not as radical as many advocates of a strong ecosystem management regime will desire. As unwise as it has been to forget to consult the common law about ecosystem management, yet more unwise would it be to expect or demand too much from it. This is why amorphous models were avoided for developing common law principles of ecosystem management, such as preserving “wildness,” or conserving “biodiversity,” or even protecting “the fragile land system” as such. Rather, my proposal comes at those goals from the other end—the practical, economic end—by being grounded in the demonstrable economic harms that flow from the degradation of natural capital and the ecosystem services it produces.

Admittedly, any approach based on proof of eco-

nomie harm will not address all the instances in which sound ecosystem management principles might point in the direction of resource protection. The degradation of natural capital often is caused by the cumulative effects of dispersed and diverse actions, and the resulting depletion of ecosystem services may be distant in time or location. Causation will be difficult to prove in those cases. And even when causation can be reliably demonstrated, damages may be so diffusely distributed that significant transactions costs pose serious obstacles to successful prosecution of a nuisance claim. More broadly, it will not always be the case that a local or regional “fragile land system” produces ecosystem services of any substantial economic value, in which case the availability of a nuisance claim is a moot point. By no means, therefore, is it suggested that nuisance law, even were courts and litigants enthusiastically to embrace my proposal, will fill all the gaps in ecosystem management law.

On the other hand, nuisance law also did not provide a complete response to pollution, but nobody has suggested that nuisance law should not have been pursued in pollution cases, or that it was unimportant to the formulation of pollution legislation. Like pollution law, ecosystem management law will employ a variety of legal instruments and institutions. The point is that nuisance law can play an indispensable role in the evolution of that larger body of law, and that it has been overlooked at the expense of the ecological values we hope the law of ecosystem management will help us sustain. Indeed, there is no reason to stop at nuisance law in this regard, as a variety of common law tort and property doctrines are aptly suited for evolution toward the new understanding of the value of natural capital and the ecosystem services it produces. See, e.g., Michael Blumm, *Lucas’s Unlikely Legacy: The Rise of Background Principles as Categorical Takings Defenses*, HARV. ENVTL. L. REV. (forthcoming 2005) (describing how common law doctrines such as water rights, navigation servitudes, and customary rights could form background principles within the meaning of *Lucas*). And someday, perhaps, the developing body of law may coalesce into a common law of ecosystem services, complete with its own specialized cause of action.

Even so, it is best to take this renaissance one step at a time. At most, therefore, I hope this article describes a way for the common law of nuisance to operate at the interface of ecology and economics to provide a foundation for public legislation and a forum for resolving private civil disputes over the reasonableness of behavior. If this evolutionary step accomplishes that much, it will have proven yet again how flexible and powerful the common law still can be. 