ANTI-WASTE

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It may be a bad idea to waste resources, but is it illegal? Legally speaking, what does "waste" even mean? Though the concept may appear completely subjective, this Article builds a framework for understanding how the law identifies and addresses waste.

Drawing upon property and natural resource doctrines, this Article finds that the law selects from a catalog of five specific, and sometimes competing, societal values to define waste. These values include: (1) economic efficiency; (2) human flourishing: (3) concern for future generations: (4) stability and consistency; and, (5) ecology. The law recognizes waste in terms of one of, or a combination of, these values.

After identifying something as waste, the law seeks to eliminate it via targeted anti-waste provisions, which follow one of three approaches. First, "usage-veto" measures empower select parties to halt perceived wasteful changes to resource uses. Second, "market-facilitating" measures prevent economic waste by encouraging and correcting markets. Third, "sustainability" measures proscribe wasteful overconsumption of those resources that are fundamental to human and ecosystem flourishing.

Through this framework, this Article synthesizes seemingly disparate property and resource doctrines into a coherent legal approach to the idea of waste. This overarching understanding of legal waste explains how individual anti-waste provisions originate and operate. Further, the waste framework serves as a practical tool for analyzing whether anti-waste laws remain in touch with current resource contexts and societal preferences. Finally, it offers theoretical insight about how anti-waste provisions work cumulatively to inject a necessary adaptability into property law.

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INTRODUCTION

We all know one thing about waste: it is bad.[1] It is hard to find an individual who generally favors wasting something.[2] Beyond that, however, opinions diverge about what constitutes "waste," rendering it a difficult term to define. Depending on the factual context or one's values, the same action may or may not be considered waste.

Consider the example of an apple tree. Letting unharvested apples fall from the tree may be waste to some. Using the apples as decoration rather than eating them or donating them to the hungry may be waste in another sense. Allowing people to pick apples from the tree for free instead of selling them may be a different form of waste. Alternatively, allowing the tree to remain instead of planting a different crop, say wine-grapes, could also be waste in a sense. Even maintaining the tree instead of cutting it down to make way for a highway or shopping mall may

1. *See, e.g.*, Edward J. McCaffery, *Must We Have the Right To Waste?*, *in* NEW ESSAYS IN THE LEGAL AND POLITICAL THEORY OF PROPERTY 76, 91 (Stephen R. Munzer ed., 2001). ("[E]verybody knows that waste is bad; this is, in fact, largely what the word means.").

2. *See id.* at 77 ("Anglo-American society has never liked waste, in moral or consequential terms . . . .").

be considered waste to some. But, then again, none of these instances necessarily constitutes waste.

Different conceptions of waste abound and, to indulge in one more example, Marc Reisner recounts a memorable instance in his western-water classic, *Cadillac Desert*:

> "You're from the Park Service, aren't you?" Mulholland demanded more than asked.
>
> "Yes, I am," said Albright. "Why do you ask?"
>
> "Why?" Mulholland said archly. "Why? I'll tell you why. You have a beautiful park up north. A majestic park. Yosemite Park, it's called. You've been there, have you?"
>
> Albright said he had. He was the park's superintendent.
>
> "Well, I'm going to tell you what I'd do with your park. Do you want to know what I would do?"
>
> Albright said he did.
>
> "Well, I'll tell you. You know this new photographic process they've invented? It's called Pathé. It makes everything seem lifelike. The hues and coloration are magnificent. Well, then, what I would do, if I were custodian of your park, is I'd hire a dozen of the best photographers in the world. I'd build them cabins in Yosemite Valley and pay them something and give them all the film they wanted. I'd say, 'This park is yours. It's yours for one year. I want you to take photographs in every season. I want you to capture all the colors, all the waterfalls, all the snow, and all the majesty. I especially want you to photograph the rivers. In the early summer, when the Merced River roars, I want to see that.' And then I'd leave them be. And in a year I'd come back, and take their film, and send it out and have it developed and treated by Pathé. And then I would print the pictures in thousands of books and send them to every library. I would urge every magazine in the country to print them and tell every gallery and museum to hang them. I would make certain that every American saw them. And then," Mulholland said slowly, with what Albright remembered as a vulpine grin, "and then do you know what I would do? I'd go in there and build a dam from one side of that valley to the other and *stop the goddamned waste*!"[3]

Mulholland's view may seem outdated or even repugnant to some, but it might seem rational or possibly morally mandated to others. As this example illustrates, one person's waste is another's preferred use; there can be such vehement difference of opinion over the principle of waste because the idea has no ethically neutral definition. Waste is an "essentially contested concept"[4] that varies by individual.

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3. MARC REISNER, CADILLAC DESERT 91–92 (Penguin 1993) (emphasis added).

4. For a discussion of "essentially contested concepts," see Jeremy Waldron, *Is the Rule of Law an Essentially Contested Concept (In Florida)?*, 21 LAW & PHIL. 137, 148

Identifying waste is not solely an individual enterprise, though. In fact, American law has attempted to define and eliminate waste throughout history; from common law to statute, and across a number of different contexts, our legal system has struggled in defining and working to prevent waste.

These attempts to define and deal with waste—which one might term "anti-waste" measures—are the focus of this Article. Though anti-waste measures offer insight into both property theory and practical resource management, scholarship has yet to consider the various anti-waste doctrines collectively or holistically. While legal concepts of waste have intrigued scholars since the days of Blackstone,[5] the existing literature tends to address only select doctrines in relative isolation. For example, the common-law property doctrine of "waste" (hereinafter referred to as "landlord–tenant waste"[6]) has been examined by notable legal scholars such as Thomas Merrill, Richard Posner, and Jed Purdy.[7] Addressing a different facet of waste, Edward McCaffery has explored how the concept of wasteful expenditures fits into notions of property and how taxation might address such waste.[8] Finally, Joseph Sax and Lior Strahilevitz have discussed different sides of the waste coin by addressing, respectively, protections for culturally important property and owners' rights to destroy property.[9]

This Article builds on existing scholarship by broadening the discussion of waste and anti-waste laws. It looks at legally cognizable waste more globally and considers anti-waste measures across the spectrum of property and natural resources law, seeking an overarching understanding of how the law identifies and addresses waste.[10] Additionally, by assembling and synthesizing anti-waste measures, this

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n.27 (2002) (citing W. B. Gallie, *Essentially Contested Concepts*, 56 PROC. OF THE ARISTOTELIAN SOC'Y 167 (1956)).

5. *See, e.g.*, John A. Lovett, *Doctrines of Waste in a Landscape of Waste*, 72 MO. L. REV. 1209, 1209 (2007).

6. The doctrine is commonly referred to simply as "the law of waste." *See, e.g.*, Thomas W. Merrill, Melms v. Pabst Brewing Co. *and the Doctrine of Waste in American Property Law*, 94 MARQ. L. REV. 1055, 1055 (2011). However, this Article will use "landlord–tenant waste" because, although this is not a widely accepted name for the doctrine, some distinguishing label is necessary to differentiate this particular waste doctrine from the other concepts of waste discussed herein.

7. *See id.*; JEDEDIAH PURDY, THE MEANING OF PROPERTY 45–63 (2010); Richard A. Posner, *Comment on Merrill on the Law of Waste*, 94 MARQ. L. REV. 1095 (2011); Jedediah Purdy, *The American Transformation of Waste Doctrine: A Pluralist Interpretation*, 91 CORNELL L. REV. 653 (2006).

8. *See generally* McCaffery, *supra* note 1.

9. *See* JOSEPH L. SAX, PLAYING DARTS WITH A REMBRANDT: PUBLIC AND PRIVATE RIGHTS IN CULTURAL TREASURES (1999); Lior Jacob Strahilevitz, *The Right to Destroy*, 114 YALE L.J. 781 (2005).

10. This Article is not limited to considering only anti-waste provisions that explicitly use the term "waste." Rather, it considers how the law identifies and addresses concepts of waste, regardless of whether the term "waste" is used. *See* discussion *infra* Part II. While a survey of the use of the term "waste" throughout American jurisprudence would also be valuable, that is a project for another article.

Article challenges the assumption that property law is reluctant or unable to deal with waste.[11]

This Article proceeds in four Parts. Part I introduces the contested concept of waste and its interplay with property principles.

Part II asserts that the law recognizes waste based on the examination of two factors: perceived resource context, i.e., whether a resource is perceived as over- or underused, and specific societal values. In identifying waste, the law first acknowledges a perception of resource overuse or underuse. Next, the law adopts one or more of the following (sometimes competing) values: (1) economic efficiency; (2) human flourishing; (3) concern for future generations; (4) stability and consistency; and, (5) ecology. The law then defines waste by applying the chosen value, or combination of values, to the perceived resource context. This framework provides an overarching understanding of how the law identifies legally cognizable waste.

Part III adds to this framework by explaining how anti-waste provisions develop in response to instances of legally cognizable waste, and how these provisions operate to address them. Examining a broad array of property and natural resource doctrines, this Part finds that anti-waste provisions are not scattered, divergent, ad hoc policies. Rather, approaches to combatting waste fall consistently into three categories: usage-vetoes, market-facilitating measures, and sustainability measures. "Usage-veto" provisions empower selected parties to halt perceived wasteful changes to resource uses; "market-facilitating" measures prevent economic waste by encouraging and correcting markets; and "sustainability" measures proscribe the wasteful overconsumption of those resources that are fundamental to human and ecosystem flourishing.

Finally, Part IV explores the theoretical and practical implications of this waste framework. It suggests that the adaptable concept of waste brings responsive agility to an otherwise ponderous realm of property doctrines, allowing resource management regimes to keep in step with changing resource perceptions and societal values. This Part then uses the waste framework as a tool for evaluating individual anti-waste measures, as well as for informing broader property concepts.

I. PROPERTY AND THE CONTESTED CONCEPT OF WASTE

Autonomy is a cornerstone of property ownership.[12] Thus, one can describe interests in property or resources as "bundles of sticks" that typically include not

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11. For example, Edward McCaffery suggests that the law essentially does not address "nonurgent" waste, such as seemingly poor choices to spend resources on economically desirable but nonessential ends, e.g., luxury goods instead of pressing needs. *See* McCaffery, *supra* note 1, at 86, 89. He is not alone in this regard. *See, e.g.*, Larissa Katz, *Spite and Extortion: A Jurisdictional Principle of Abuse of Property Right*, 122 YALE L.J. 1444, 1448 (2013) ("While the law might prohibit certain uses of property, the story goes, it has no business scrutinizing an owner's reasons for choosing among otherwise permitted uses."). However, Parts II.B.2 and III.C of this Article offer instances of the law intervening to police this very concept of waste.

12. *See, e.g.*, Larissa Katz, *Exclusion and Exclusivity in Property Law*, 58 U. TORONTO L.J. 275, 311 (2008) ("[f]reedom is the key justificatory reason for ownership . .

only the right to exclude others, but also the right to use (or not use) property.[13] As the maxim *sic utere tuo ut alienum non laedas* instructs, one generally must not use one's property in such a way that would injure the lawful rights of one's neighbors.[14] But, beyond that, our laws leave a property owner with great latitude—latitude so great, in fact, that throughout the history of Roman, English, and American law, property owners have been given the right to destroy their property.[15] As Larissa Katz has put it, "Ownership's defining characteristic is that it is the special authority to set the agenda for a resource."[16]

For the most part, however, a property owner's latitude in using his or her property does not raise social concerns about too much destruction of property or nonvaluable use of resources. Self-interest typically drives property owners to use resources in socially desirable ways and, in turn, causes them to forego exercising their rights to destroy, abandon, or simply not use valuable property.[17] Thus, for the most part, the law takes a laissez-faire approach to property in that it does not compel a particular use of property or resources.[18] To take the example of a privately owned wilderness, "property law is seen as essentially neutral, neither encouraging nor discouraging wilderness destruction, except in the limited sense of facilitating owner autonomy."[19] Thus, "[p]roperty law is primarily concerned *not with what* so-and-so may or may not do with Blackacre, *but with who* decides what so-and-so may do."[20]

Providing property owners such freedom certainly advances autonomy values, but in some limited instances, property law's laissez-faire approach yields cause for concern, particularly when it leads to the perceived "waste" of resources.[21] In some such instances the law intervenes with anti-waste measures that, to borrow

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."); Henry E. Smith, Response, *Mind the Gap: The Indirect Relation Between Ends and Means in American Property Law*, 94 CORNELL L. REV. 959, 964 (2009) ("[T]he owner usually can use the property for a variety of uses without answering to outsiders.").

13. *See, e.g.*, THOMAS W. MERRILL & HENRY E. SMITH, PROPERTY: PRINCIPLES AND POLICIES 16 (2d ed. 2012).

14. *See, e.g.*, 57A Am. Jur. 2d Negligence § 89

15. *See* Strahilevitz, *supra* note 9, at 787–88; McCaffery, *supra* note 1, at 76; Katz, *supra* note 12, at 313.

16. Katz, *supra* note 12, at 290; *see also* Katz, *supra* note 11 at 1450 ("Owners have the standing to resolve what I will call the Basic Question: what (in their view) constitutes a worthwhile use of a thing.").

17. *See, e.g.*, Harold Demsetz, *Toward a Theory of Property Rights*, AM. ECON. REV., Vol. 57, No. 2, Papers and Proceedings of the Seventy-Ninth Annual Meeting of the American Economic Association, at 347 (1967).

18. *See, e.g.*, Nestor M. Davidson, *Property and Relative Status*, 107 MICH. L. REV. 757, 798 (2009) ("[A]n important, if often implicit, assumption in much of the literature on property's role in incentives and allocation, [is] namely the utilitarian default that preferences are value neutral.").

19. John G. Sprankling, *The Antiwilderness Bias in American Property Law*, 63 U. CHI. L. REV. 519, 520 (1996).

20. James Y. Stern, *Property's Constitution*, 101 CALIF. L. REV. 277, 294 (2013) (emphasis added).

21. *Cf.* Katz, *supra* note 11, at 1461 ("Ownership, unlike other positions of authority, does not rely on the special expertise or unique suitability of a particular holder of a right to make decisions affecting a thing.").

Katz's phrasing,[22] circumscribe the owner's special authority to "set the agenda for a resource," and instead steer resource use in a particularly preferred, i.e., non-wasteful, direction. These laws may originate at federal or state levels, may stem from common law or statute, and may apply to a variety of different scenarios. Nonetheless, they all find common purpose by seeking to avoid the specter of waste, however defined.

Attempts to prevent waste, though, inject a degree of chaos into property laws. Instead of allowing property to organize around concepts of autonomy or agenda-setting authority,[23] anti-waste laws introduce a new guiding principle fraught with subjectivity. Waste is an essentially contested concept without a single endpoint.

For example, one of the more commonly held understandings of waste stems from John Locke's concepts of morality and divine justice.[24] These ideas of waste and waste prevention usually entail avoiding the destruction or underuse of something of value. To illustrate, "[U]nder a Lockean conception of waste, it is improper to kill a wild animal and then leave it to rot in the forest."[25] This is the case even if one owns both the land that the animal was roaming and the right to kill the animal. From this Lockean perspective, "waste refer[s] to the dissipation or destruction of a permanent physical asset."[26] While self-interest normally prevents such actions,[27] concern about this concept of waste persists, particularly in arguments for curtailing a property owner's right to destroy her property. [28]

However, a more utilitarian conception of waste might find no objection to the same behavior that Locke would condemn. Consider the same illustrative example provided in the previous paragraph: from a utilitarian perspective, killing a feral pig because it might ravage cropland,[29] and then leaving it to rot in the forest because one does not enjoy eating wild pig, would not necessarily constitute waste. From a similar perspective, laws mandating the preservation of historic buildings might be criticized as wasteful in the sense that they "can obscure the social waste

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22. *See* Katz, *supra* note 12, at 290.

23. Autonomy has been seen as a principle and central aim of property law, which protects the rights of a relatively stable and predictable agenda-setter for a resource, namely, the owner. *See* Katz *supra* note 12; Smith *supra* note 12. Granted, "autonomy" itself is a malleable concept. *See, e.g.*, Eric T. Freyfogle, *Property and Liberty*, 34 HARV. ENVTL. L. REV. 75 (2010).

24. *See* John Locke, *Second Treatise of Government*, *in* TWO TREATISES OF GOVERNMENT 285, 308 (Peter Laslett ed., Cambridge Univ. Press 2d ed. 1970) (1690) ("As much as any one can make use of to any advantage of life before it spoils; so much he may by his labour fix a Property in. Whatever is beyond this, is more than his share, and belongs to others. Nothing was made by God for Man to spoil or destroy.").

25. Strahilevitz, *supra* note 9, at 789.

26. McCaffery, *supra* note 1, at 77.

27. *See, e.g.*, *id.*

28. *See, e.g.*, Strahilevitz, *supra* note 9, at 784, 786, 820.

29. Many states have attempted to eradicate feral pigs for just this reason. *See, e.g.*, Susan Montoya Bryan, *$1M Pilot Project Aims to Take Out Feral Pigs*, AP (March 18, 2013, 2:58 PM), http://bigstory.ap.org/article/1m-pilot-project-aims-take-out-feral-pigs.

that results from excessive preservation or insufficient creation."[30] Some might view these laws, however, as preventing another form of waste—the alteration of great architecture.[31]

Moreover, if one refines the utilitarian perspective with a more economically oriented approach, the waste calculus might change even further. For example, killing a feral pig to prevent crop damage and not eating it as a matter of taste is fine; but because some people treat wild pig as a delicacy[32] and are willing to pay for it,[33] the failure to retrieve and sell the pig might constitute waste.[34] In such a case, the failure to realize the gains from trade between willing buyers and willing sellers results in a form of economic waste.[35] Thus, one might identify "wasteful nonuse" as a "fail[ure] to exploit economic opportunities fully,"[36] or, more vernacularly, a variation of waste embodying the idea that "one man's trash is another man's treasure."

Then again, the prospect of bringing the pig out of the woods and trying to sell it might represent a "waste of time" for the hunter. To cast this in economic terms, an opportunity cost exists in the retrieving and selling of the pig.[37] Unless the hunter's earnings from selling the wild pig are sufficiently high enough to preclude the hunter from spending her time on another endeavor, the hunter would be worse off for not leaving the pig. Put another way, from the hunter's subjective standpoint, if the projected earnings of selling the pig do not meet this threshold value for foregoing the opportunity to do something else, it would be a waste, i.e. not worth her time, to take any action other than to leave the pig to rot. Moreover, if the value that the hunter places on her time is greater than the market price of the pig, then retrieving the pig would impose a deadweight loss[38] and would create an overall

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30. Strahilevitz, *supra* note 9, at 821.

31. *See* discussion *infra* Part III.A.

32. *See, e.g.*, Lizzie Enfield, *Wild Boar: Time to Pig Out*, GUARDIAN (Oct. 17, 2012), http://www.theguardian.com/lifeandstyle/2012/oct/18/wild-boar-time-to-pig-out.

33. *See, e.g.*, Logan Hawkes, *Feral Hog Income Opportunity for Hunters, Meat Processors*, WESTERN FARM PRESS (Jan. 10, 2013), http://westernfarmpress.com/management/feral-hog-income-opportunity-hunters-meat-processors.

34. *See id.*

35. *See, e.g.*, RICHARD IPPOLITO, ECONOMICS FOR LAWYERS 14 (Princeton Univ. Press 2005) ("[T]rading can improve the welfare of all the participants to the trade. Owing to diminishing marginal utility and the fact that individuals do not all have the same preferences for goods, an arbitrary allocation of goods to individuals is usually not as good as the allocation that individuals choose if given the opportunity to trade.").

36. Strahilevitz, *supra* note 9, at 792.

37. *See, e.g.*, IPPOLITO, *supra* note 35, at 121 (illustrating opportunity costs in terms of going to a baseball game by noting that the out-of-pocket costs of attending a baseball game are "ticket cost plus the costs of transportation and parking" while the opportunity cost of going to the ballgame "is that you did not spend your money and time engaging in the next best thing you could have done"). In addition to this opportunity cost, there is also a transaction cost associated with selling the pig. *See* R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 1–3, 6–8, 13–19 (1960).

38. IPPOLITO, *supra* note 35, at 70 (explaining deadweight loss as "a loss to one person not offset by a gain to others").

negative-utility value—wasting the hunter's time and diminishing net societal well-being.[39]

Conversely, from the standpoint of a starving individual or a society concerned with food availability, the hunter's choice to leave the pig rather than to take some measure to add it to the food supply[40] might be considered waste. This view of waste eschews the subjective, endogenous valuation of the hunter[41] and instead focuses on external, exogenous prioritization of resource uses. Thus, a market-based valuation would not be entirely relevant, and, instead, one would identify waste "as the relatively nonurgent expenditure of scarce resources," particularly on luxury, leisure, or other non-essential items.[42] Such an approach to waste disapproves of "frivolous, or excessive consumption [or] poor choices [from an external viewpoint] of how to spend time or value."[43] This concept of waste downplays individual utility values and instead focuses on externally imposed concepts of optimal resource use.[44] Thus, if the hunter subjectively determined that retrieving the pig was not worth her time, the individual utility value would not be the relevant measure. Instead, an external—and arguably objective—standard might determine that the hunter's actions of shooting and leaving the animal were excessively indulgent as a form of luxury or leisure, making them wasteful.[45] Such a conception of waste "is not constrained by self-interest" as other forms of waste might be.[46]

Alternatively, one may move entirely away from a Lockean, utilitarian, economic, or frivolous-consumption calculation of waste. Perhaps killing a pig and leaving it to rot might serve an expressive function—say, if done as a statement about the destructive power of guns, or if intended to be a commentary about animal

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39. *See generally* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 10–15 (7th ed. 2007).

40. *Cf.* Robert Samuels, *Rock Creek Park Sharpshooting Operation Yields 20 Deer*, WASH. POST (April 1, 2013), http://articles.washingtonpost.com/2013-04-01/local/38190208_1_deer-populations-sharpshooting-operation-rock-creek-park (describing an operation to reduce the deer population in Washington, D.C.'s Rock Creek Park, where 20 deer were killed and the meat was donated to the hungry).

41. This standpoint is traditionally that of utilitarian and economic theories of property. *See, e.g.*, Davidson, *supra* note 18.

42. *See, e.g.*, McCaffery, *supra* note 1, at 77.

43. *See id.* at 86.

44. Put another way, this concept calculates opportunity costs from a third party perspective.

45. This is the same idea that one might "waste time" by watching reality television instead of reading great works of literature, regardless of the fact that one may derive much greater utility from the television than the book.

46. *See, e.g.*, *id.* at 77; *see also* Davidson, *supra* note 18, at 767–68 ("One important, if frequently unstated, assumption underlying much of the diverse literature in this utilitarian and economic tradition is that the demand being satisfied through the legal institution of property is essentially self-contained. This follows from the proposition in neoclassical economics that the decision to consume is endogenous, and that production follows the consumption function. The corresponding assumption in the literature is that people generally disregard others in consuming, focusing exclusively on their own internally generated needs.").

welfare policy. In that case, one might prioritize the "expressive characteristics of property destruction" over the material property itself, and thereby find no waste.[47] As one example of such expressive behavior, Lior Strahilevitz offers the Taliban's destruction of the Buddhas of Bamiyan, "despite outcry from foreign governments and offers from museums to purchase some of the works."[48] From the Taliban's point of view, selling the Buddhas may have amounted to a wasted opportunity to make a major political and religious statement.[49]

Finally, even without the expressive message, a "Blackstonian, absolutist notion of ownership"[50] would find no waste in a property owner's nonuse or even destruction of property at his choosing.[51] Thus, unlike the Lockean disapproval of killing a wild animal and leaving it to rot in the forest, under a Blackstonian view, such an act would not be wasteful, even if done on a whim, assuming that the killer owned the animal and the right to kill it.

While these various examples illustrate some of the more common notions of waste, this chronicle is by no means exhaustive—in fact, it may represent a rather narrow band of the possible ways to think about waste.[52] Nonetheless, the examples help demonstrate that the concept of waste resists independent, objective, and normative content. Rather, it is an essentially contested concept that can vary from one individual to the next.

II. LEGALLY COGNIZABLE WASTE

While possible theoretical conceptions of waste vary tremendously, only a small number of these views are represented via anti-waste laws.[53] The law does not respond to, or even recognize, every idea of waste. Rather, the law embraces a relatively narrow set of waste concepts as legally cognizable.[54] This Part builds a

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47. *See* Strahilevitz, *supra* note 9, at 823–24.

48. *Id.* at 826. Strahilevitz goes on to describe the act further: "This destruction had an obvious religious motivation and meaning. These were not irrational acts of destruction; they were rational acts that conveyed unmistakable and attention-getting messages. The fact that the cash-strapped Taliban spurned purchase offers from foreigners shows how much it valued the expressive opportunity." *Id.* at 826–27.

49. *See id.*

50. *Id.* at 816.

51. *See, e.g.*, 3 WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND *223–*224 ("If a man be the absolute tenant in fee-simple . . . he may *commit whatever waste* his own indiscretion may prompt him to, without being impeachable or accountable for it to anyone.") (emphasis added); *see also* McCaffery, *supra* note 1, at 76 (discussing this Blackstonian conception of waste).

52. For example, each of these illustrations is limited to an anthropocentric approach.

53. *Cf.* Hanoch Dagan, *Pluralism and Perfectionism in Private Law*, 112 COLUM. L. REV. 1409, 1410 (2012) ("To be sure, explicitly, or more frequently implicitly, private law theories do recognize the gap between values that should guide us as moral agents and values that should be entrenched in law.").

54. *See id.* ("Given that law backs up its normative prescriptions with coercive power, at least in a liberal legal system its demands are typically more modest than those of morality.").

framework for understanding exactly how the law identifies waste that is sufficient to trigger a legal response.

The law recognizes waste based upon the convergence of two factors: (A) perceived resource context and (B) specific societal values. To identify waste, the law first assesses the perceived resource context, determining if external, physical information suggests that a particular resource is overused or underused. Next, the law adopts one or more of the following values: (1) economic efficiency; (2) human flourishing; (3) concern for future generations; (4) stability and consistency; and, (5) ecology. Reflecting more internal, abstract concepts,[55] these societal values serve as guides for evaluating the merits of resource uses. As explained in greater detail below, some of these values—such as human flourishing, concern for future generations, and ecological concerns— complement each other sufficiently such that they are able to work in combination. Other values take such fundamentally competing views on the merits of resource uses that the views rarely harmonize and instead function more singularly, e.g., economic-efficiency values versus stability and consistency values. Finally, after establishing the perceived resource context and relevant societal value, or combination of values, the law defines waste by applying the chosen value(s) to the perceived resource context.

This framework of applying specific societal values to perceived resource contexts offers an overarching understanding of how the law identifies waste. Certainly different combinations of specific values and perceived resource contexts can lead to vastly divergent substantive concepts of waste,[56] but the law's procedure for identifying waste remains constant across values, contexts, resources, and circumstances.

Moreover, the primacy of perceived resource context and specific societal values distinguishes anti-waste measures from other aspects of property law. This is not to say that anti-waste measures are completely discrete from other regulations on property use, such as zoning, for example. Rather, anti-waste measures differ more in degree than in kind. The elevated attention to perceived resource context and specific societal values unifies anti-waste doctrines. The fact that otherwise disparate doctrines share these common, distinctive concerns makes their comparisons both theoretically interesting and practically useful.[57]

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55. Of course, some interdependence and circularity is inherent here—perception of resource context is necessarily influenced by one's values, and one's values are bound to change based on her perception of the surrounding physical world. Nonetheless, despite the fact that the two factors can inform each other, they maintain an independence and descriptive usefulness based on their overall external versus internal, and physical versus abstract, properties.

56. Though the Article will take up many examples of the variety of waste doctrine, a leading natural resources casebook, JAMES RASBAND ET AL., NATURAL RESOURCES LAW AND POLICY 747 (2d ed. 2009), highlights a particularly cogent example. "In the East, to 'waste' water is to consume it needlessly or excessively. In the West, to waste water is *not* to consume it—to let it flow unimpeded or undiverted down rivers." *Id.* at 747–48 (emphasis in original).

57. *See* discussion *infra* Part IV.

For example, most property principles take little enduring account of scarcity and, thus, little enduring account of the perceived resource context. The theory goes that property rights arise as a response to scarcity,[58] but once property rights are established, property's concern with scarcity largely ends. Certainly scarcity might affect the market price of property,[59] but the law is, for the most part, hands off in that regard. With legally cognizable waste, however, perceptions of relative resource scarcity are central. In fact, the law's distaste for waste stems largely from the idea of scarcity.[60]

Similarly, waste concepts break from the ordinary property law mold by elevating other specific societal values above autonomy. As previously discussed, property law normally prioritizes autonomy and defers to the agenda-setting authority of the property owner,[61] but anti-waste measures that prescribe resource use limit this individual autonomy. This is a key feature of anti-waste provisions: they remove some of the owner's private agenda-setting authority and invest that authority in some other party, sacrificing a degree of agenda-setting authority in service of the specific societal values identified above.

This Part examines in more detail how the dual consideration of perceived resource context and specific societal values gives anti-waste provisions their character, both in distilling legally cognizable waste from the essentially contested philosophical concept of waste, and in distinguishing legal anti-waste provisions from other property law doctrines.

A. Perceived Resource Context

The perception of scarcity is central to nearly all legal conceptions of waste. With no resource scarcity, current or future, there can be no waste, at least not in the eyes of the law.[62] An infinite resource permits no such concept. Thus, any evaluation

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58. *See, e.g.*, POSNER, *supra* note 39, at 38 ("[I]f a resource is valuable but not scarce (a paradox?) the creation of property rights does not serve an economizing function."); RASBAND ET AL., *supra* note 56, at 741 ("After all, the catalyst for all natural resources law is scarcity."); JEREMY WALDRON, THE RIGHT TO PRIVATE PROPERTY 31–32 (1988) ("Scarcity . . . is a presupposition of all sensible talk about property . . . .[S]o long as it obtains, individuals (either on their own or in groups) are going to disagree about who is to make which use of what."); Davidson, *supra* note 18, at 765 ("If a perspective on property might be said to have achieved dominance in contemporary theory, it is the basic utilitarian and economic perspective that sees the institution of property primarily as a response to problems posed by scarcity.").

59. *See generally* IPPOLITO, *supra* note 35, at 83–88.

60. *Cf.* POSNER, *supra* note 39, at 27 ("One should not be surprised that in a world of scarce resources waste should be regarded as immoral.").

61. There are, of course, exceptions to this general rule. *See, e.g.*, Joseph William Singer, *No Right To Exclude: Public Accommodations and Private Property*, 90 NW. U.L. REV. 1283 (1996) (discussing limitations on autonomy in the case of public accommodations).

62. This is the case, at least, with physical property. In the intellectual property context, one might conceive of waste even with relatively nonrival, and thus nonscarce, intellectual property goods; for example, a production of the goods that leads to no benefit. *See, e.g.*, Justin Hughes, *The Philosophy of Intellectual Property*, 77 GEO. L.J. 287, 299 (1988). While the perceived resource context, i.e. scarcity, is not as applicable in considering

of the relative abundance or scarcity of a resource is a fundamental consideration for legally cognizable waste. Abundance or scarcity is also a physical, quantifiable, external fact—so theoretically it is objectively determinable. However, it is the perception of relative abundance or scarcity, rather than the absolute underlying fact, that most impacts conceptions of waste.

Legally cognizable waste concepts are not built on scarcity alone. Rather they also include the relationship between resource use and relative scarcity. For example, if a resource is perceived to be abundant, overuse is less likely to be a concern, and if a resource is not in demand for use, its abundance is of less concern. Thus, it is a use-to-scarcity ratio or the "perceived resource context" ratio that truly informs legal waste. Three perceived resource contexts impact determinations about waste (or a lack thereof): satisfactory use, underuse, and overuse.

Satisfactory use does not lead to perceptions of legally cognizable waste. Anti-waste measures respond to displeasure at perceived resource misuse, and as far as legal anti-waste measures are concerned, without sufficient displeasure, no waste occurs. So, where there is satisfactory use, there is no need to introduce a new anti-waste measure, and where a preexisting anti-waste measure operates to maintain satisfactory use, there is no need to alter the existing measure. However, where there is unsatisfactory resource use, whether overuse or underuse,[63] there can be legally cognizable waste and, if it is great enough, the law will impose anti-waste measures.

Underuse of resources is one example of an unsatisfactory perceived resource context that can amount to waste.[64] One can attribute underuse to underproduction of a resource itself; for example, insufficient legal access to extract the natural gas necessary to generate desired energy levels.[65] Alternately, underuse might also describe the physical escape of a resource; for example, accessing a desired amount of natural gas but failing to capture or harness a large percentage of it.[66] Underuse can also describe too little production of positive externalities or co-benefits associated with a resource use; for example, not realizing a desired level of

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waste in the context of intellectual property, the specific societal values discussed later in this Article help inform legal ideas of waste for both physical and intellectual property. The balance of this Article will focus on treatment of waste for physical property and reserve a fuller treatment of intellectual property for another article.

63. *Cf.* WILLIAM ASCHER, WHY GOVERNMENTS WASTE NATURAL RESOURCES: POLICY FAILURES IN DEVELOPING COUNTRIES 36 (Johns Hopkins Univ. Press 1999) ("[E]ven conservationists should condemn both over- and underexploitation. We can define underexploitation as resource development and extraction that falls short of fulfilling society's potential for gains, taking into account all considerations of benefits and costs. If a low level of resource extraction is indeed in society's interest, perhaps because it permits the intact resource stock to provide environmental services, or because extraction requires great economic or environmental costs, then low extraction is optimal; underextraction would be even lower."); Michael A. Heller, *The Boundaries of Private Property*, 108 YALE L.J. 1163, 1197 (1999) ("[P]eople can waste resources equally through overuse and underuse.").

64. *Cf.* McCaffery, *supra* note 1, at 88 (identifying a conception of waste as "nonuse—the failure beneficially to use one's time, talents, or resources").

65. Such underuse might result from property entitlements limiting access to natural gas reservoirs, possibly because of anti-commons or holdout problems. *See* discussion *infra* Part III.B.

66. *See* discussion *infra* Part IV.A.2.

energy independence as a result of too little domestic natural gas production relative to imported fuel.[67]

The converse unsatisfactory perceived resource context is overuse, which can take two forms. First, it can be too much use of an actual resource; for example, burning too much natural gas and causing a perceived threat to supplies. Alternatively, perceived overuse can describe use of one resource that causes negative externalities to occur.[68] Such overuse might include the perception of burning too much natural gas not because of a threat to supplies but because of its release of harmful greenhouse gasses. In this sense, the use of one resource might be considered wasteful because of its impacts on another resource.

In sum, the perception of unsatisfactory resource underuse or overuse with respect to resource supplies is a key factor in identifying legally cognizable waste.

B. Specific Societal Values

Societal values complement perceived resource contexts in informing legally cognizable waste. In this context, these values function like priorities; they offer guiding principles for preferences in resource use, or nonuse. To make explicit the basic (or at least a linguistically tautologous) connection between "values" and "value": values lead people to assign value to resources. Thus, if one can broadly define waste as the misuse of a thing of value,[69] then a thing with no value cannot be wasted, regardless of its scarcity. Without values as a precedent condition, a concept of waste is difficult to imagine.

In the abstract, the catalog of potential values that might impact a determination of waste is as long and as varied as the many possible conceptions of waste. A survey of legal anti-waste provisions[70] and scholarship,[71] however, reveals that the law embraces only a few specific societal values to identify legally cognizable waste. Specifically, the law embraces: (1) economic efficiency; (2) human flourishing; (3) concern for future generations; (4) stability and consistency; and, (5) ecology.[72] The following Subparts discuss how these values inform legal conceptions of waste.

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67. *See, e.g.*, *The Plan*, PICKENS PLAN, http://www.pickensplan.com/the-plan/ (last visited Aug. 15, 2014) (advocating for natural gas as an alternative to imported fuel).

68. *See, e.g.*, Strahilevitz, *supra* note 9, at 796–803.

69. *Cf. id.* at 796 ("Courts have identified two closely related bases for restricting the right to destroy. While excising theological strains from Locke's antiwaste argument, they have embraced his notion that society must not tolerate the waste of valuable resources.").

70. *See* discussion *infra* Part III.

71. *See* the remainder of this Subpart.

72. Related to these societal values impacting waste determinations, Jed Purdy has discussed four competing views of the natural world that shape American attitudes toward nature and underscore much of the conflict in our environmental laws. *See* Jedediah Purdy, *American Natures: The Shape of Conflict in Environmental Law*, 36 HARV. ENVTL. L. REV. 169, 172 (2012). Purdy categorizes these views of the natural world as: (1) a resource open to human exploitation and to be developed for productive economic progress; (2) a resource that will serve human needs but that requires expert management; (3) a sort of secular cathedral or place of romantic epiphany; and, (4) an ecologically interdependent web. *Id.* at

1. Economic-Efficiency Utilitarian Concerns

Welfarist utilitarianism is one of the most important underlying values guiding anti-waste laws, and to property law in general.[73] Its objective is to maximize the total wealth of society through efficient allocation of resources, with efficiency being defined as the point where the societal welfare gains are greater than the societal welfare losses that result from a change in resource allocation.[74]

Essential to this concept of welfare maximization is how one calculates welfare, with welfare here simply reflecting value as measured by the willingness to pay for something.[75] Thus, under this approach, "value is simply and strictly a matter of subjective preferences."[76] The more someone is willing to pay, the more that person values the item, and the more his owning and realizing that value contributes to social welfare. In this context, when resources are prevented from achieving their highest valued use, they are not deployed efficiently and waste results.

From this economic point of view, a free market provides the most potent measure of protection against such waste. As Adam Smith's famous "invisible hand" metaphor explains, self-interest will result in gains from trade and put resources in the hands of those that value them most.[77] The oft-cited Coase Theorem[78] reflects the same principle, asserting that in functioning markets with low transaction costs, resources will be allocated efficiently regardless of any initial allocation of property entitlements.[79] The basic economic premise, as paraphrased by Richard Posner, is that "resources tend to gravitate toward their most valuable uses if voluntary exchange—a market—is permitted."[80]

This idea of a voluntary market for valuable uses is strongly tied to autonomy concepts. After all, measuring the efficient use of a resource based on subjective preferences,[81] evidenced by a willingness to pay, necessarily anticipates

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173–75. Though Purdy's taxonomy takes a different focus than this Article's, the underlying substance of his categories is largely consistent with the different values that define waste and approaches taken by anti-waste measures.

73. *See, e.g.*, Lior Jacob Strahilevitz, *Absolute Preferences and Relative Preferences in Property Law*, 160 U. PA. L. REV. 2157, 2157–58 (2012) ("The dominant form of legal discourse in contemporary America is welfarist. . . . most property scholars presume that maximizing social welfare is the primary goal of a property system."). This value, with its concern for economic efficiency, underscores the prevalent law-and-economics approach to property. See Gregory S. Alexander, *The Social Obligation Norm in American Property Law*, 94 CORNELL L. REV. 745, 745 (2009) ("[L]aw-and-economics theory [is] the dominant mode of theorizing about property in contemporary legal scholarship.").

74. *See, e.g.*, IPPOLITO, *supra* note 35, at 72; POSNER, *supra* note 39, at 13. This is also called the Kaldor–Hicks definition of efficiency. *See* POSNER, *supra* note 39, at 13.

75. POSNER, *supra* note 39, at 10.

76. *See, e.g.*, McCaffery, *supra* note 1, at 87.

77. ADAM SMITH, THE WEALTH OF NATIONS: AN INQUIRY INTO THE NATURE AND CAUSES ¶ IV.2.9 (1776).

78. *See* MERRILL & SMITH, *supra* note 13, at 31 (noting that the article laying out the Coase Theorem "has become the most frequently cited work in all of legal scholarship").

79. *See generally* Coase, *supra* note 37.

80. POSNER, *supra* note 39, at 9.

81. *See, e.g.*, McCaffery, *supra* note 1, at 87.

a wide freedom in choices about resource use. From an economic point of view, "[t]he value of free choice is a central tenet"[82] and "[a]ny time a consumer is pushed away from his optimal allocation of income, harm is imposed."[83] As a result, legal anti-waste measures that interfere with autonomy by steering resource uses one way or another may initially seem at odds with economic-efficiency values.[84] Some might even say they create waste rather than prevent it.[85]

However, even anti-waste laws that interfere with a degree of autonomy can comport with economic-efficiency values when the anti-waste measures seek to correct market malfunctions that either prevent gainful trades or create costs without creating offsetting benefits. Thus, from the standpoint of economic efficiency, the primary reason for implementing legal anti-waste provisions is to prevent barriers to a voluntary market, and to reduce or eliminate costs that have no offsetting gains, i.e., deadweight losses.[86] An economic concept of waste might simply refer to anything that costs more than necessary, i.e., where costs exceed benefits, assuming that all costs are internalized. Thus, the goal of economically oriented anti-waste measures is essentially to internalize all costs and eliminate those that do not yield benefits. Economically motivated anti-waste measures typically pursue this goal by reducing transaction costs to allow for gainful trades, internalizing external costs to allow for correct pricing, and eliminating commons problems that create deadweight losses.

First, for efficient markets to function, transaction costs must not be so high as to prevent gainful trades.[87] For example, a lack of information to market participants may prevent uninformed parties from entering trades that would otherwise yield efficient resource uses.[88] Thus, government intervention may be necessary to foster markets, and thereby prevent waste, by disseminating information and lowering transaction costs. Additionally, when it is impossible to meaningfully lower transaction costs because of assembly problems, bilateral monopolies, or other impediments,[89] economic efficiency may call for adjusting

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82. IPPOLITO, *supra* note 35, at 1 (discussing the indispensability of free choice in understanding the concept of a demand curve).

83. *Id.* at 27.

84. *Cf. id.* at 139 ("Regulatory solutions require armies of bureaucrats to write and enforce the regulations dictating what they think the highest-value uses must be (which are unlikely to be coincident with consumers' definitions except perhaps for some 'median' citizen). In this system, it almost certainly is true that many high-value users will be squeezed out of the market in favor of low-value users, creating a large loss in total surplus.").

85. *See id.*

86. *Id.* at 70 (defining deadweight loss as "[a] loss to one person not offset by a gain to others. When one person loses utility from some market interference, such as a tax, and no one gains any utility, then a deadweight loss is said to arise"); *cf.* ASCHER, *supra* note 63, at 1 ("Many rich countries, including the United States, have wasted natural resources and continue to do so: pastures erode for overgrazing, soils become contaminated, and forests are leveled, often *without offsetting benefits for society*.") (emphasis added).

87. *Cf.* Coase, *supra* note 37.

88. *See, e.g.*, IPPOLITO, *supra* note 35, at 248. Similarly, assembly problems in attempting to organize or coordinate property rights among multiple owners can also create high transaction costs. *See, e.g.*, MERRILL & SMITH, *supra* note 13, at 39.

89. *See, e.g.*, MERRILL & SMITH, *supra* note 13, at 39.

property entitlements to approximate the result of low transaction costs. This leads to more valuable resource uses and, ideally, to the formation of more functional markets.[90]

Second, economically oriented anti-waste measures might seek to correct market-pricing failures caused by a lack of information or by externalized costs. To ensure that the market functions correctly, and that resources flow to their highest value uses, it is imperative that the cost of resource use is priced correctly.[91] When there are undervalued or unpriced costs, the benefits of a resource use may not truly exceed the costs and the market will not reach the efficient outcome,[92] leading to an instance of economic waste.[93] A common reason for undervalued or unpriced costs is a lack of market information, which leads to improper pricing.[94] Thus, a key aspect of economic anti-waste measures involves internalizing externalities, whether through disseminating information[95] or market correction.[96]

Third, economic anti-waste measures seek to avoid common-pool resource problems that result in deadweight losses, such as rent erosion, where ill-defined property rights lead to races to capture resources and the effort spent on these races approaches the value of the resource.[97] Economists consider resources expended on such races as pure waste.[98] Economic anti-waste measures also seek to avoid

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90. *Cf.* Coase, *supra* note 37.

91. *See* ASCHER, *supra* note 63, at 36 (noting that "[c]osts include not only the direct and obvious costs of exploiting the resource but also the lost opportunities that developing and extracting it would foreclose . . . [such as] the economic benefits that alternative uses of capital, effort, and the land itself could have produced [or] the environmental benefits from leaving the resources intact rather than extracting them").

92. *Cf. id.* at 16 ("[G]overnments chronically ignore the first principle of resource economics for public lands, namely, that they should charge the users the full value of the resources they extract, lest the users overexploit 'cheap' resources.").

93. When resource use is underpriced, for example, by failing to account for the cost of negative externalities, "then the resource exploiters can still profit from selling units that are not societally worthwhile, given the damage they cause." *Id.* at 41.

94. *See id.* at 44 ("[L]ack of information . . . will cause resource exploiters to choose the wrong resources, the wrong timing, or the wrong resource-exploitation techniques, depending on the nature of their ignorance. The consequences may be either under- or overexploitation, depending on the biases caused by faulty information.").

95. Disseminating information might also be considered lowering transaction costs of gaining information. *Cf.* Coase, *supra* note 37.

96. A further extension of this economic concept would also evaluate anti-waste measures to see if the cost of enforcing the measure creates a better result than even an imperfect market with some externalities. *See, e.g.*, IPPOLITO, *supra* note 35, at 239 ("The real-world question is whether a government-imposed solution is likely to generate more surplus than an imperfect free market that includes some externalities.").

97. *See, e.g., id.* at 136.

98. *See id.* at 227 ("Whenever property rights are ill defined, resources are devoted to obtaining them. These expenditures are pure waste. Resources used to seize property rights to a [sic] existing asset have an opportunity cost. They could be used to create goods and services.").

tragedy-of-the-commons problems, where individuals with access to a common pool resource each act in their own self-interest but degrade the resource as a whole.[99]

Once anti-waste measures respond to these three issues by enabling markets and by internalizing costs, then, from an economic efficiency standpoint, the work is largely done and the now functioning markets avoid waste in their natural course. As discussed above, with markets allowing resources to flow to their highest valued uses, the invisible hand works to prevent waste.

Economically oriented property and resource-law scholarship identifies and addresses waste in similar market-facilitating and market-correcting terms. For example, Richard Posner has described the doctrine of landlord–tenant waste as a response to inefficiencies caused by transaction costs and bilateral monopolies inherent in the ownership of divided estates.[100] Similarly, in the natural resource context, Professor William Baxter has articulated an economic-efficiency "no-waste criterion" as a meta-principle for environmental policy questions.[101] Baxter's framework seeks to maximize "human satisfaction" value from limited resources by engaging in a cost-benefit analysis of resource preservation versus resource use.[102] Moreover, Baxter's concept of waste expressly counts human willingness to pay as the sole criterion by which to evaluate resource-use decisions, flatly rejecting any other measure of environmental health or value.[103] Relatedly, political scientist William Ascher has relied on the same economic conception of waste in his book *Why Governments Waste Resources*, which asserts that "a given resource should be developed only if its net benefits are greater than the benefits arising from alternative uses, and we should extract each resource unit when its net benefit is greatest."[104]

2. Human-Flourishing Concerns

While economic-efficiency utilitarianism contributes much to property theory and informs legally cognizable waste, it is not the only value that the law embraces to identify and address waste.[105] Concern with human flourishing also impacts legal conceptions of waste.

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99. *See, e.g.*, ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 2–3 (1990).

100. *See* Posner, *supra* note 7, at 1095–96.

101. *See* WILLIAM F. BAXTER, PEOPLE OR PENGUINS: THE CASE FOR OPTIMAL POLLUTION 3–4 (1974).

102. *See id.*

103. *See id.*at 3–9 ("[M]y criteria are oriented to people, not penguins . . . I have no interest in preserving penguins for their own sake . . . I reject the proposition that we *ought* to respect 'the balance of nature' or to 'preserve the environment' unless the reason for doing so, express or implied, is the benefit of man.") (emphasis in original); *see also* Barton H. Thompson, Jr., *People or Prairie Chickens: The Uncertain Search for Optimal Biodiversity*, 51 STAN. L. REV. 1127, 1131 (1999) (summarizing Baxter's no-waste criterion in terms of the endangered species act as "ensuring the optimum use of society's resources requires not only identifying the value of endangered species, but weighing that value against the value of the other uses to which we could put the resources necessary to save endangered species").

104. ASCHER, *supra* note 63, at 36.

105. *Cf. id.* at 253 ("[T]he efficiency concerns [discussed in his book] have obviously focused on natural-resources exploitation. Yet there is another notion of efficiency

Human-flourishing concerns are actually not too dissimilar to economic-efficiency utilitarianism in their objectives.[106] Both economic-efficiency utilitarianism and human-flourishing values have the idea of maximizing some measure of social welfare in common. The key difference between the two is *how* one measures social welfare. Human flourishing measures waste according to fundamental human needs rather than market efficiency; this distinction in welfare metrics can lead to vastly different conceptions of waste.

As discussed above, economic efficiency utilitarianism measures welfare as the aggregate of subjective preferences. This is an endogenous measure reflected by a willingness to pay, and economic efficiency does not concern itself with the underlying motivation, context, or urgency of these preferences. Under this measure, waste is a failure to put a resource to its highest valued use, leaving individual computations of value unexamined.

Human-flourishing values, however, take a different measure of welfare, and, thus, take a different measure of waste. Rather than serving endogenous, subjective valuation, human-flourishing concerns attempt to serve an exogenous, objective valuation. Such an approach might disregard individual subjective preferences in favor of some conception of what is in the best interest of society, i.e., what is fundamentally necessary for a life well-lived. Put another way, the economically efficient use of a resource may not be its best use from a human flourishing point-of-view, leading to a prioritization of resource uses instead of the value neutrality of economic efficiency. Under this approach, a resource use that does not sufficiently serve fundamental human needs may be considered wasteful, even if it would fetch the highest price.[107]

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that emerges . . . [G]iven that sound resource exploitation is often sacrificed in order to pursue other objectives, we may also ask how well those other objectives are achieved through maneuvers in the resource sectors. Does this success make up for the waste of natural resources?"); POSNER, *supra* note 39, at 11, 27 ("'[E]fficiency,' when used . . . to denote that allocation of resources in which value is maximized, has limitations as an ethical criterion of social decisionmaking" and "there is more to justice than economics . . . "); Vlad Tarko, *Elinor Ostrom's Life and Work*, *in* THE FUTURE OF THE COMMONS: BEYOND MARKET FAILURE AND GOVERNMENT REGULATION 50 (IEA 2012) ("Economic efficiency is just one possible social goal among many, and most people would disagree that it is a goal that trumps all others. Other social goals such as fairness, stability, social peace, voice and inclusivity, liberty, long-term resilience and adaptability, are often considered as important if not more important than economic efficiency.").

106. *Cf.* Jedediah Purdy, *A Few Questions About the Social-Obligation Norm*, 94 CORNELL L. REV. 949, 955 (2009) ("For uber-utilitarian Jeremy Bentham and his followers, the moral gravamen of the program was (in significant part) that it counted the well-being of all alike; those reformers scorned obscurantist modes of reasoning that they saw as preserving the inequitable privileges of elites. Utilitarianism, then, was in good part a view about equality, and as a mode of justification, it relied on the idea that all who participated in social life were obliged to respect that idea of equality—that is, to embrace a set of institutions and rules designed on the principle that the welfare (or, happiness) of each counted alike.").

107. *See* Davidson, *supra* note 18, at 798 ("[T]he assumption of value neutrality has long been challenged and critiques about materialism and ecological harm fit comfortably within a normative tradition that does not concede that all preference satisfaction is equal.").

Jedediah Purdy has explored such "noneconomic" approaches in property law generally and landlord–tenant waste in particular, examining the law's "motives arising from ideas about civic order, individual dignity and personality, visions of national purpose, and other such qualitative goods."[108] Purdy has stressed that, in addition to economic efficiency concerns, property doctrines rely on egalitarian principles such as the "rejection of hierarchical social relations," as well as overall flourishing concerns such as promoting social progress via settlement of the natural world.[109]

Gregory Alexander has also articulated how human-flourishing values might fit in the broader context of property law. He suggests that "[s]ocial structures, including distributions of property rights and the definition of the rights that go along with the ownership of property, should be judged, at least in part, by the degree to which they foster the participation by human beings in these objectively valuable patterns of existence and interaction."[110] Alexander has stressed property law's particular role in "cultivating the conditions necessary for members of our communities to live well-lived lives and to promote just social relations, where *justice means something more than simply aggregate wealth-maximization*."[111]

Eduardo Peñalver's scholarship develops similar themes. For example, in his virtue-based theory of land use, Peñalver calls for a "substantive conception of the human good or flourishing,"[112] which requires "recognition of the importance of values in addition to those of self-interested wealth maximization."[113] Peñalver further suggests "owners' rights are qualified by an obligation to share from their surplus property with those who need them in order to satisfy more *fundamental needs*."[114]

Though not expressly addressing the idea of waste, Alexander's and Peñalver's approaches outline the human-flourishing value that identifies legally cognizable waste in terms of satisfaction of objectively-recognized fundamental needs for a life well-lived. Such needs certainly include the basics for human survival, but they can extend further depending on one's conception of what is necessary for a fulfilling life.

This concept of waste based on human flourishing and fundamental needs strikes a common chord with Edward McCaffery's work, which identifies a concept of waste as nonurgent luxury expenditures.[115] Drawing upon the philosophies of Thomas Scanlon and John Rawls,[116] McCaffery measures waste not by an economic-efficiency-guided subjective valuation, but instead by objective measures

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108. PURDY, *supra* note 7, at 44. Purdy has also stressed that there is necessary overlap between the "economic" and "noneconomic" purposes of property law, which come together in service of a general concern for social order. *See id* at 45, 47.

109. *Id.* at 62–63.

110. Alexander, *supra* note 73, at 764.

111. *Id.* at 819 (emphasis added).

112. Eduardo M. Peñalver, *Land Virtues*, 94 CORNELL L. REV. 821, 864–67 (2009).

113. *Id.*

114. *Id.* at 880 (emphasis added).

115. See McCaffery, *supra* note 1, at 87.

116. *See id.*

of interpersonal value, described by Scanlon and, in turn, by McCaffery, as "urgency."[117] While McCaffery leaves some play in the definition of urgency, he ties it to the general idea of fundamentally necessary and important expenditures. Thus, he offers, "it is 'waste,' say, to spend money on a lesser urgent need while allowing a more pressing matter to wait, or to buy one more luxury car or fur coat when one has garages and closets full enough as is."[118] McCaffery also illustrates nonurgent waste in terms of natural resources, positing that "nonurgent waste of capital is a harmful public use: Squandering money on baubles is like failing to replenish the soil or polluting waterways."[119]

A concept of waste based on these human-flourishing ideals necessitates anti-waste measures that go beyond merely facilitating and correcting markets. Unlike the economic-efficiency value, which relies on functioning markets to combat waste, in the case of fundamental needs and nonurgent waste, one "cannot count on the invisible hand of subjective self-interested action to serve the collective good" because the "subjective and reasonable objective interests diverge when it comes to nonurgent waste."[120] Thus, anti-waste measures designed to serve human flourishing concerns must define objective interests and steer resource use in those directions, thereby curtailing autonomy in service of some identified greater good.

3. Concern for Future Generations

Closely related to the concern for human flourishing is the concern for future generations, which takes account of the flourishing of those to come.[121] As Edith Brown Weiss has noted, "the notion that each generation holds the earth as a trustee or steward for its descendants strikes a deep chord with all cultures, religions, and nationalities. Nearly all human traditions recognize that we, the living, are sojourners on earth and temporary stewards of our resources."[122] Thus, when animated by concern for future generations, "a social welfare measure might accord similar weight to the well-being of individuals ten generations into the future as it does to the well-being of the present generations."[123] From this perspective, waste means a foreclosing of options for future generations to meet their needs.

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117. *See, e.g., id.*

118. *Id.* at 88.

119. *Id.* at 92; *see also* Davidson, *supra* note 18, at 757, 762 ("In particular, status signaling can skew property's incentive and allocative benefits, leading people to over-invest in status-enhancing property and undermining welfare gains associated with trades around property" and "this may over-incentivize the production of, or investment in, status-related resources. These kinds of incentives perennially risk misallocation, both between the choice to invest resources in property and the choice not to, and between status-related versus non-status-related resources within the realm of property.").

120. *See, e.g.*, McCaffery, *supra* note 1, at 88.

121. *See* ASCHER, *supra* note 63, at 32 ("[A] resource practice should not lead to lower societal well-being for future generations.").

122. Edith Brown Weiss, *In Fairness to Future Generations and Sustainable Development*, 8 AM. U. INT'L L. REV. 19, 20 (1992); *see also* EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS (1989).

123. STEVEN SHAVELL, FOUNDATIONS OF ECONOMIC ANALYSIS OF LAW 71 n.74 (2004).

While this concern for future generations is widely held, it raises the question of which anti-waste measures best protect the interests of generations to come. Some scholars have suggested that economic-efficiency principles, such as those discussed above, sufficiently protect future generations from waste and no further anti-waste measures are necessary.[124] For example, Harold Demsetz has offered the influential theory that property owners with sufficiently durable rights will optimally maximize the value of property over time rather than overexploit it in the short term.[125] Richard Posner has illustrated this concept by describing how economic incentives will prevent a private owner from prematurely depleting natural resources such as timber:[126]

> In deciding whether to cut down a tree, the private owner of the land on which the tree is growing will consider not only the revenue from the sale of the timber and the cost of cutting down and sawing the tree but also the opportunity cost of not waiting until the tree has grown to its full height.[127]

Applying these concepts to the anti-waste context leads to the conclusion that functioning markets should sufficiently protect future generations from waste. The theory suggests that the market should account for both present and future costs and benefits—attending to the needs of future generations through the same invisible hand that prevents waste in the present.

This theory, however, has drawn criticism on the basis that the market cannot sufficiently serve future generations due to present value discounting, split incentives between divided interests, and the durability of present-resource uses.[128] As a result, concern for future generations may define waste more broadly than the economic-efficiency utilitarian conception, and legal efforts to protect future generations from waste may go beyond mere market correction.

The first reason that markets may not sufficiently shield future generations from waste comes from the idea that even in functioning markets, present value discounting of future costs and benefits may lead rational actors to waste resources from the perspective of future generations. Rational economic actors make decisions based on "present value of the net benefits," which requires "adjust[ing] the valuation of benefits and costs occurring at different times."[129] This leads to the discounting of future benefits because "generally a benefit coming earlier is valued more than one coming later, because of both impatience and the opportunity to invest current savings for greater value in the future."[130] Additionally, to the extent that there is a lack of information on future costs and benefits, resource users are

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124. *See, e.g.*, Richard A. Epstein, *Justice Across the Generations*, 67 TEX. L. REV. 1465, 1466 (1989).

125. *See* Demsetz, *supra* note 17, at 355; *see also* Peñalver, *supra* note 112, at 848.

126. *See* POSNER, *supra* note 39, at 87.

127. *Id.*

128. *See, e.g.*, Peñalver, *supra* note 112.

129. ASCHER, *supra* note 63, at 33.

130. *Id.*

likely to err on the side of maximizing current benefits.[131] By logical extension, this discounting, in turn, forces property owners to "completely disregard the consequences of their decisions beyond a certain point in the future."[132] As a result:

> [P]rivate owners are likely dramatically to underweigh—relative to short-term consequences—costs (or gains) arising from their land-use choices when those effects are projected to occur far into the future. This preference for near-term gains generates intertemporal externalities, which may be enormous and catastrophic, but which are impossible for an unassisted land market to internalize.[133]

Thus, even in a functioning market, the rational economic action of present-value discounting may impose waste on future generations.

Second, divided interests and split incentives may require further market interventions to protect future generations from waste. A divided interest exists between "[t]he present generation[, which] owns the whole of the earth and all the things on it,"[134] and future generations, who will come to own the whole of the earth. Those alive today may not only discount future uses to present value, but they might also "care very little about the well-being of individuals ten generations in the future."[135] This creates a split incentive in which economic motivations alone will not protect future generations, i.e., future interest holders, from wasteful use by the current generation, i.e., present interest holders. Posner illustrates this concept once again through the example of economic incentives in tree cutting, only this time he presents a split-incentive scenario arising from the divided interests between a life tenant, i.e., present interest holder, and remainderman, future interest holder:

> A life tenant will have an incentive to maximize not the value of the property—that is, the present value of the entire stream of future earnings obtainable from it—but only the present value of the earnings stream obtainable during his expected lifetime. He will therefore want to cut timber before it has attained its mature growth even though the present value of the timber would be greater if the cutting of some or all of it were postponed, if the added value from waiting would inure to the remainderman.[136]

Because the present generation is in the same present-interest position as Posner's hypothetical life tenants, the same risk of waste exists in regard to future generations,

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131. *See id.* at 44 ("[L]ack of information . . . will cause resource exploiters to choose the wrong resources, the wrong timing, or the wrong resource exploitation techniques, depending on the nature of their ignorance. The consequences may be either under- or overexploitation, depending on the biases caused by faulty information. However, insofar as resource exploiters know that ignorance puts them at risk of making blunders in long-term resource development and extraction plans, they tend to extract resources quickly wherever immediate profits appear. Therefore, there may be a greater tendency toward immediate overextraction and inadequate resource development. Ignorance will also provoke wasteful exploitation due to lack of knowledge of true input costs or output prices.").

132. Peñalver, *supra* note 112, at 854.

133. *Id.*

134. SHAVELL, *supra* note 123, at 71.

135. *Id.* at 71 n.74.

136. POSNER, *supra* note 39, at 73–74.

who are in the same future-interest position as the hypothetical remainderman. Thus, the concern for future generations counsels that legal measures beyond market correction are necessary to prevent rational, self-interested present-interest property owners from imposing waste on generations to come.[137]

Finally, the enduring legacy of resource uses may also prejudice future generations. As Peñalver has discussed, resource decisions often effect durable changes that foreclose options for future generations.[138] Moreover, present resource decisions have longer-term impacts in terms of "deplet[ing] the capital stock" available to future generations.[139]

The durability of present resource uses as well as present-value discounting and split incentives between divided interests, the concept of waste, when viewed from the perspective of future generations, encompasses more than economic efficiency as measured by willingness to pay. Rather, the idea of waste in terms of future generations also includes the idea of foreclosing options. As a result, anti-waste measures concerned with protecting future generations may go beyond facilitating and correcting market forces, and instead affirmatively steer resource uses to preserve options for generations to come.

4. Stability and Consistency Concerns

Apart from concerns for economic efficiency, human flourishing, or future generations, values favoring societal stability and consistency also inform legal conceptions of waste and motivate anti-waste principles. These stability and consistency concerns include protecting settled expectations, preserving the status quo, ensuring quiet enjoyment of property, and keeping the peace. Relatedly, these same values also underscore efforts to maintain cultural continuity, which can manifest in measures to preserve cultural legacies or identities, such as historic buildings in urban settings or agricultural land use in farming communities.

From the perspective of stability and consistency concerns, waste takes the form of disruption, replacement, or alteration of the fundamental character of some designated resource use. This idea of waste might also be conceived as the cost (monetarily, emotionally, culturally, or otherwise) of shifting expectations and adapting to new circumstances. Examples of such waste might include tearing down a historic building, selling a public park into private ownership, or shifting a residential neighborhood to commercial use. Such ideas of waste rely on subjective valuation, but this valuation differs from the economic-efficiency willingness to pay or the human-flourishing, fundamental-needs metrics discussed above. Instead, this stability and consistency concern responds to a social value placed on preservation or continuation of certain cultural resource uses.

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137. *Cf. id.* at 73 ("[L]aw has an important role to play in regulating divided ownership.").

138. Peñalver, *supra* note 112, at 853 ("The durability of land-use decisions' consequences and the finite quantity of land mean that the decisions that current owners make about how to use their land will reverberate for generations.").

139. McCaffery, *supra* note 1, at 94.

Joseph Sax's scholarship develops some of these stability and continuity concerns. For example, in his book *Playing Darts with a Rembrandt*, Sax highlights the cultural values in fine art, architecture, important papers, and antiquities, suggesting that "[s]ome objects . . . regardless of who owns them, are important to a larger community."[140] Accordingly, Sax argues, the "larger community has a legitimate stake [in these objects] because they embody ideas, or scientific and historic information, of importance."[141] Thus, Sax suggests that unqualified notions of ownership are inappropriate for such property, and he proposes protections, which essentially amount to anti-waste measures, guarding against destruction or denial of access to that property.[142]

These same values underscore decisions to regulate resource uses for the purpose of protecting communities, cultural traditions, or ways of life. Notable examples of such resource regulations come from efforts to maintain historic water use and availability to support cultural continuity, for instance by restricting the sale of water so that agricultural communities maintain their character and do not give way to other forms of development.[143] Sax has addressed similar issues in the context of water use, describing water as a "community's capital stock"[144] as well as a "heritage resource."[145] Extending this concept, stability and continuity values counsel that heritage resources be protected from waste because communities are attached to water in the same way that cultures are attached to their antiquities and cultural properties.[146] Explicitly linking Sax's concepts to the idea of waste, Buzz Thompson has noted that "the central importance of of [sic] water to communities' development and sustainability has spawned universal rules against waste" and "[t]he United States Supreme Court also has lent some credence to the heritage concept by suggesting that states can prohibit the exportation of water in some settings where the Constitution would prohibit similar hoarding of other natural resources."[147]

Whether deployed toward community interests in natural resources, art, or architecture, these cultural stability and continuity values also resonate with Margaret Radin's scholarship linking property and personhood. Drawing on Hegel's philosophy of property rights,[148] Radin suggests that certain types of property

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140. SAX, *supra* note 9, at 1.

141. *Id.* at 9.

142. *Id.* at 9–10.

143. *See, e.g.*, *In re* Application of Sleeper, Rio Arriba County No. RA 84-53(C) (N.M. 1st Jud. Dist. April 16, 1985) (denying a water transfer application from farmers to a ski resort because "it is simply assumed by the Applicants that greater economic benefits are more desirable than the preservation of cultural identity. This is clearly not so . . .").

144. Joseph L. Sax, *The Constitution, Property Rights, and the Future of Water Law*, 61 U. COLO. L. REV. 257, 276, 282 (1990).

145. *See* Joseph L. Sax, *Understanding Transfers: Community Rights and the Privatization of Water*, 1 HASTINGSW.-NW. J. ENVTL. L. & POL'Y 13, 14 (1994).

146. *See id.*

147. Barton H. Thompson, Jr., *Water Law as a Pragmatic Exercise: Professor Joseph Sax's Water Scholarship*, 25 ECOLOGY L.Q. 363, 368–69 (1998) (citing Sporhase v. Nebraska *ex rel.* Douglas, 458 U.S. 941 (1982)).

148. *See* Margaret Jane Radin, *Property and Personhood*, 34 STAN. L. REV. 957, 968, 971–78 (1982).

closely contribute to one's personhood and self-conception and thus should be treated differently than otherwise fungible property.[149] Extending this personhood concept from the individual to the community level, just as certain forms of property may be bound up in identity and self-conception, so may certain resources be bound up in the defining attributes of a community, and such resources may merit anti-waste protections.

Taken together, these approaches to maintaining certain uses of architecture, art, water, or other nonfungible resources, reflect a conception of waste quite different from those discussed in previous sections. Rather than defining waste according to economics, human flourishing, or concern for future generations, this conception of waste primarily guards against the interruption, destabilization, or destruction of culture, community, or identity.

5. Ecological Concerns

Finally, ecological values introduce a concept of waste concerned with maintaining ecosystem integrity. While this Subpart makes no attempt at comprehensively surveying the rich field of environmental ethics, it highlights a few noteworthy examples of ecological values that have influenced legally cognizable waste conceptions. For instance, Aldo Leopold's "land ethic" is considered "probably the most influential statement of ethics in the American environmental movement."[150] In it, Leopold lays a foundation for ecologically centered conceptions of waste, stating, "It is inconceivable to me that an ethical relation to land can exist without love, respect, and admiration for land, and a high regard for its value. By value, I of course mean *something far broader than mere economic value*; I mean value in the philosophical sense."[151] To operationalize this concept, Leopold suggests evaluating resource uses "in terms of what is ethically and esthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."[152]

Sax's scholarship has incorporated similar ecological concepts. For example, Sax has called for "property rights designed to accommodate both transformational needs and the needs of nature's economy."[153] Moreover, Sax has advocated for "[resource] use . . . determined ecosystemically, rather than tract by tract," "[i]ncreased ecological planning, because different kinds of lands have

149. *See, e.g.*, MARGARET JANE RADIN, CONTESTED COMMODITIES 54–78 (1996); Radin, *supra* note 147, at 968, 971–78; *see also* Nestor M. Davidson, *Standardization and Pluralism in Property Law*, 61 VAND. L. REV. 1597, 1620–21 (2008); Davidson, *supra* note 18, at 770 ("Just as the basic economic approach to property generally assumes endogenous demand, it is likewise significant that prevailing conceptions of property and identity take the relationship between property and personhood as largely inward looking.").

150. RASBAND ET AL., *supra* note 56, at 13.

151. ALDO LEOPOLD, A SAND COUNTY ALMANAC—AND SKETCHES HERE AND THERE 223 (1949) (emphasis added).

152. *Id.* at 224–25.

153. *See, e.g.*, Joseph L. Sax, *Property Rights and the Economy of Nature: Understanding Lucas v. South Carolina Coastal Council*, 45 STAN. L. REV. 1433, 1451 (1993).

different roles," and "[a]ffirmative obligations by owners to protect natural services."[154]

Because these ecological perspectives respond to inherent ecosystem values that evade monetary measures, cost-benefit analyses are inapplicable and inappropriate as a metric for determining waste.[155] Instead, Leopold's metric of preserving the integrity, stability, and beauty of the biotic community serves as a central guiding principle of ecologically oriented anti-waste measures.[156]

III. ANTI-WASTE MEASURES

Part II set out a framework for identifying legally cognizable waste through the convergence of the perceived resource context and specific societal values. Part III now extends that framework to explain how the law addresses legally cognizable waste via anti-waste provisions. In responding to the perceived resource contexts and specific societal values discussed above, anti-waste provisions have displayed both commonality and consistency. Despite arising in different circumstances across various resources, jurisdictions, and time periods, legal anti-waste measures fall within one of three categories: (1) usage-vetoes; (2) market-facilitating measures; and, (3) sustainability measures. Usage-veto provisions empower selected parties to halt perceived wasteful changes to resource uses; market-facilitating measures prevent economic waste by encouraging and correcting markets; and sustainability measures proscribe wasteful overconsumption of resources fundamental to human and ecosystem flourishing. This Part details how anti-waste laws originate and operate according to these consistent structures.

A. Usage-Vetoes

Usage-veto measures, which include some of the earliest anti-waste doctrines instituted in the American legal experience, respond primarily to stability and continuity values, and arise in perceived resource contexts of overuse or threatened overuse. To prevent overuse, usage-veto measures essentially bestow on certain select individuals a private veto power over the resource uses of others.[157] Thus, these doctrines withdraw some autonomy over resource uses from the owner, and shift that authority to particular private individuals.[158] The individuals selected

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154. *See, e.g., id.*

155. *See, e.g.*, Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553, 1562–63 (2002); Amy Sinden, *The Tragedy of the Commons and the Myth of a Private Property Solution*, 78 U. COLO. L. REV. 533, 536–37 (2007); Peñalver, *supra* note 112, at 850–51.

156. *See* LEOPOLD, *supra* note 151, at 224–25.

157. *See, e.g.*, Purdy, *supra* note 7, at 687 (describing the law of landlord–tenant waste as a presumptive veto).

158. By limiting owners' agenda-setting rights, usage-veto measures resemble what Henry Smith has described as "governance rules," which "require the specification of proper activities" or "prescribe proper use" of a resource. *See* Henry E. Smith, *Exclusion Versus Governance: Two Strategies for Delineating Property Rights*, 31 J. LEGAL STUD. 453, 455–56 (2002); *see also* Katz, *supra* note 12, at 287 ("Governance rules represent the kind of ad hoc, pragmatic determination of use rights" and "[o]n a governance strategy, unlike on the exclusion strategy, the owner is not picked out as special vis-à-vis others.").

to receive this veto authority normally favor established resource uses and thus exercise the veto authority to "arrest a future conflicting use."[159] As a result, these usage-veto measures consistently limit resource development in favor of maintaining the status quo.[160] Through this "semi-preservationist"[161] system, usage-veto measures guard against waste in the form of disrupting, replacing, or altering resource uses.[162]

Examples of usage-veto measures operating to promote stability in resource uses include the earliest of American property doctrines.[163] Such measures, which were inherited directly from English property law, were based on concern for avoiding perceived overuse of resources, such as wood and water, which were in relatively limited supply in England.[164] Further, the English laws reflected a concern for preserving certain "natural" uses of land, such as historic agricultural practices.[165] These conditions and perceptions in England led to English usage-veto measures, which were then adopted into the early American common law.

However, as the doctrines discussed in this section will demonstrate, unlike many examples of governance rules, in which agenda-setting authority shifts from the owner to a governmental entity, in the case of usage-veto rules, agenda setting authority shifts from the owner to another private individual.

159. *See* MORTON HORWITZ, THE TRANSFORMATION OF AMERICAN LAW, 1780–1860, 32 (1977) (internal quotations omitted).

160. *Id.* at 32, 36. For example, one eighteenth century doctrine for resolving conflicts over property uses was "an explicitly antidevelopment theory, limit[ing] property owners to what courts regarded as the natural uses of their lands." *Id.* at 32; *see also* Freyfogle, *supra* note 23, at 87 ("Before the coming of industrialism, American law largely resolved conflicts by favoring land uses that were sensitive or that came first in time, at the expense of later, more intensive land uses.").

161. *See* Sprankling, *supra* note 19, at 524.

162. *See* discussion *supra* Part II.B.4.

163. *See* HORWITZ, *supra* note 159, at 36 (positing that a prevailing conception in early American history was that resources were "not essentially an instrumental good or a productive asset but rather a private estate to be enjoyed for its own sake.").

164. *See* Sprankling, *supra* note 19, at 534 ("Altering the character of land—for example, converting forest to farm land—was deemed waste. Similarly, subject to intricate exceptions for wood used on the property for fuel and repairs, any cutting of 'timber' trees—such as oak, ash, and elm—generally constituted waste. In part, these precepts reflected a wood-dependent economy increasingly hobbled by a wood scarcity. Confronted with the choice between exploiting or conserving the nation's dwindling forests, English law unsurprisingly favored conservation."); *see also id.* at 523–25 ("Eighteenth-century English property law was a poor tool for encouraging the exploitation of virgin land. The vast English wilderness had vanished long before the discovery of America, leaving a semipreservationist property law system attuned to a postwilderness nation. Most of the English countryside resembled a large garden, with crop land and permanent grass pasture occupying over half of the land surface; the forest remnants were uniformly devoted to human use, as woodlot, pasture, or the like. The property law system focused on preserving the condition of land already in productive use in a mature agrarian economy, not on expanding an inchoate economy through the settlement of wild land. Moreover, in an England plagued by a chronic wood shortage, the system was already oriented toward protection of the nation's dwindling forests. *Stability, not innovation*, was the heart of English property law.") (emphasis added).

165. *See id.*

For example, against this backdrop, the doctrine of landlord–tenant waste arose to regulate how a term- or life-tenant could use the estate she occupied.[166] This English law of landlord–tenant waste initially governed the American colonies and provided that landlords could expect tenants to return property unaltered unless the landlord consented to some form of change.[167] Thus, landlords, often concerned with overuse or changes to the existing use of land, held veto rights over their tenants' use of resources, and they routinely disallowed tenants from cutting trees or converting land from forest to farm.[168] As a result, this usage-veto system "perpetuate[d] the land-use status quo . . . by preferring existing uses to new uses,"[169] and thereby avoided the apparent waste that came from altering the property.

Another example of usage-veto measures limiting property development in service of stability values comes from the early American experience with the English water-law doctrine of natural flow. This doctrine prevented interference with water flowing in its natural course and held "any use of water that conflicted with the interests of any other proprietor on the stream was an unlawful invasion of his property."[170] Thus, while water could be used for domestic purposes or husbandry, both of which required little diversion of water and, thus, did not materially change its flow, "[a]ll other interference[] with the natural flow of water, including both diversion and obstruction were illegal without the consent of all who have an interest in it."[171] This effectively gave downstream water users the power to veto upstream water uses that involved any substantial diversion of water. Preventing increased diversion of water effectively prevented changes in both water and land use, again averting any perceived wasteful disruption of settled usage patterns.

A century after the colonial period, early laws governing oil and gas exploration in America also imposed usage-veto measures that effectively curtailed development in order to preserve the status quo. For example, landowners had to limit drilling efforts because neighbors could sue to prevent a well from draining oil or gas resources from beyond a property line.[172] With oil and gas rights tied to land ownership,[173] parties relied on the longstanding English *ad coelum* doctrine for the proposition that a landowner also owned the oil beneath his land,[174] regardless of

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166. *See* Purdy, *supra* note 7, at 658.

167. *See id.*

168. *See* Sprankling, *supra* note 19, at 533–34. Landlord–tenant waste can also be seen as serving an economic-efficiency value in terms of managing "the temporally inefficient situation of a present owner's neglecting the interests of some future owner." *See, e.g.*, McCaffery, *supra* note 1, at 84. However, this will be discussed at greater length in the next section, where economic-efficiency concerns attempt to strike a more optimal balance between present use and future interests.

169. *See* Sprankling, *supra* note 19, at 534.

170. *See* HORWITZ, *supra* note 159, at 35.

171. *Id.* at 36 (internal quotations omitted).

172. *Cf.* BRUCE M. KRAMER & PATRICK R. MARTIN, THE LAW OF POOLING AND UNITIZATION § 1.02 (3d ed. 2012).

173. *See id.*

174. The *ad coelum* doctrine derived from Lord Coke's maxim: *Cujus est solum, ejus est usque ad coelum et ad inferos*; translated: "To whomsoever the soil belongs, he owns also to the sky and to the depths." BLACK'S LAW DICTIONARY 341 (5th ed. 1979).

the fact that oil and gas resources are fugacious rather than fixed in place.[175] Fearing that a well would pull a neighbor's oil or gas across the property line and give rise to liability, early extractors had to carefully space their wells to avoid draining resources out from under neighboring tracts.[176] Thus, a neighbor enjoyed implicit power to veto oil and gas exploration near the property lines, and hydrocarbon production suffered as a result.[177] Though these impacts on oil and gas development were likely unintended, they reflect how a usage-veto system focuses on the value of maintaining existing land uses, here represented by *ad coelum* expectations, at the expense of new resource development, here oil and gas production.[178]

Usage-veto measures are not all merely transitional moments in history or anachronistic carryovers. Certain contemporary American water-law doctrines still employ usage-veto principles to favor the continuity of existing resource use. For example, the "no harm rule," a feature of the prior appropriations regimes[179] common to the western United States,[180] gives downstream water users a veto power similar to that conferred by the natural flow doctrine. Under the no-harm rule, a downstream water appropriator may, upon the showing of harm, prevent an upstream water appropriator from selling his water right or changing the nature of his water use.[181] This is the case regardless of whether the upstream appropriator holds a more senior right to take water from the stream or whether the water could be transferred to a more valuable monetary or societal use.[182] Rather, just like the natural flow doctrine, the no harm rule protects stability and continuity of existing uses by giving downstream resource users a private veto right. This scheme, like the other usage-veto regimes, cares not about causing potential economic inefficiencies or social inequalities; rather, it is aimed at preventing one specific kind of waste: the disruption of existing resource use.

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175. *See* KRAMER & MARTIN, *supra* note 172.

176. "That, in view of the well-known tendency of said wells to drain a large extent of territory immediately surrounding them, it is the custom and almost universal practice of oil operators, when operating adjoining lands, to locate their wells at least two hundred feet from the line of lands, in order that, so far as reasonably practicable, each operator's well shall draw its supply from his own land, and not unnecessarily disturb or detract from the oil mineral wealth of the adjoining lands." Kelly v. Ohio Oil Co., 49 N.E. 399, 400 (Ohio 1897) (applying a rule of capture analysis, for the first time, to a simple migration of gas across property boundaries).

177. *Cf.* KRAMER & MARTIN, *supra* note 172.

178. Moreover, the perceived resource context centered on preventing waste in the sense of overusing a neighbor's resources; the law was not aimed at addressing underuse or underdevelopment of hydrocarbon resources, both because of stability values and because hydrocarbons had not emerged as a major energy source and thus were not widely perceived as underused.

179. *See* discussion *infra* Part III.B.

180. *See generally* Norman K. Johnson & Charles T. DuMars, *A Survey of the Evolution of Western Water Law in Response to Changing Economic and Public Interest Demands*, 29 NAT. RESOURCES J. 347, 349–51 (1989).

181. *See, e.g.*, RASBAND ET AL., *supra* note 56, at 781.

182. In some circumstances, however, the no-harm rule can lead to economically efficient results. *See* POSNER, *supra* note 39, at 77.

Outside of the natural resource context, additional modern property doctrines operate on related usage-veto principles. As mentioned earlier, historic preservation laws serve stability and continuity values by preventing destruction or alteration to certain designated resource uses, usually in the form of building structures or neighborhood identities.[183] These laws employ a usage-veto system by removing some of an owner's autonomy to alter designated historic property and empowering a third party, usually an historic preservation council, with the right to veto proposed changes.[184]

Artist-rights laws function in a similar manner. These laws protect an artist's right to the integrity of her work by preventing destruction or alteration of certain pieces of art without the artist's permission.[185] Thus, regardless of who owns the art as property, the artist maintains authority to veto certain perceived wasteful or destructive uses.

Finally, the practice of organ donation offers an example of usage-veto measures at work.[186] When individuals opt to donate their organs, a usage-veto structure gives even a lone family member practical veto power over the deceased's decision to donate.[187] This anti-waste provision shows no concern for increasing the number of achievable transplants or preventing the needless destruction of organs.[188] Instead, the practice aims at preventing waste in the form of disrupting stability and continuity. In the organ–donor example, the stability of the historic cultural respect for the wishes of the deceased's family is prioritized at the expense of the autonomy of the deceased.

B. Market-Facilitating Measures

Market-facilitating measures respond to a set of perceived resource contexts and values that contrast sharply with those underlying usage-veto measures. Market-facilitating measures are usually rooted in the perceived resource context of underuse, which they seek to remedy by spurring and correcting markets

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183. *See generally* SAX, *supra* note 9, at 48–59.

184. *See generally id.*

185. *See generally id.* at 21–35; Visual Artists Rights Act of 1990, 17 U.S.C. § 106; Massachusetts Art Preservation Act, MASS. GEN. LAWS ch. 231, § 85S; California Art Preservation Act, CAL. CIV. CODE § 987.

186. *See* Strahilevitz, *supra* note 9, at 803–05.

187. Although the Uniform Anatomical Gift Act provides that the decedent's decision to donate his organs is decisive, hospitals typically will not harvest them unless his family also consents, even where the decedent has signed an organ donor card. In many cases where a decedent has indicated a desire to donate his organs on his driver's license, family objections prevent the transplantation of organs. Finally, in cases where a decedent has multiple next of kin, e.g., a parent survived by several children, the objections of any one relative can prevent a transplant as a practical matter. In short, either a decedent or his heirs usually can block physicians from transplanting his organs. The impediments that American law and custom place in the path of the socially responsible would-be donor are substantial.

Id. at 805–06.

188. *See id.* at 803–04 (describing the "needless destruction of otherwise transplantable organs").

for resource development. Moreover, unlike the stability concerns underlying usage-veto measures, the primary value motivating market-facilitating measures is economic efficiency.[189]

Many early market-facilitating measures arose in nineteenth-century American property law as a response to the development needs of the young nation[190] and as a reaction to the usage-veto measures inherited from English law.[191] These doctrines reflected a new perceived resource context that viewed the American continent as one of limitless resources[192] that were drastically underused. In fact, the perception of underuse was so great that "[e]arly Americans viewed the seemingly endless wilderness with repugnance. It impeded progress, retarded prosperity, and blocked national expansion."[193]

Societal values also shifted, replacing the allegiance to stability and continuity with the primacy of economic development.[194] As Morton Horwitz has described:

> As the spirit of economic development began to take hold of American society in the early years of the nineteenth century . . . the idea of property underwent a fundamental transformation—from a static agrarian conception entitling an owner to undisturbed enjoyment, to a dynamic, instrumental, and more abstract view of property that emphasized the newly paramount virtues of productive use and development.[195]

Thus, the prevailing societal value of the time became one of economic efficiency rooted in "exploitative utilitarianism: land in its natural condition was considered essentially worthless until converted to human use."[196]

As a result, the conception of waste necessarily changed. Gone was the idea of waste as the disruption of continuity in resource uses or alteration of the status

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189. *Cf.* POSNER, *supra* note 39, at 55 ("[A]lways to assign the property right to the prior of two conflicting land uses . . . would be inefficient, for the later use often will be more valuable yet transaction costs may be prohibitive.").

190. *See* Sprankling, *supra* note 19, at 523 ("Our common law of property is best explained as an instrumentalist adaptation of English doctrines to American wilderness conditions.").

191. *See id.*

192. *See* John G. Sprankling, *An Environmental Critique of Adverse Possession*, 79 CORNELL L. REV. 816, 857 (1994) (describing the perception of "a seemingly infinite supply of wild animals, minerals, water and other fugitive resources").

193. *See* Sprankling, *supra* note 19, at 530–31.

194. *See, e.g.*, Freyfogle, *supra* note 23, at 87 ("Then along came industrialism and its siren call to allow landowners to use their lands more forcefully, creating noises and vibrations, blocking waterways, and otherwise causing disruptions. The right to use land intensively went up while the opposing right to quiet enjoyment declined.").

195. HORWITZ, *supra* note 159, at 31.

196. Sprankling, *supra* note 19, at 531; *see also* HORWITZ, *supra* note 159, at 37 (noting that judicial opinions began to reflect "the idea that the ownership of property implies above all the right develop that property for business purposes"); Purdy, *supra* note 7, at 692. ("Progress and improvement were the courts' aims, and westward movement across the continent was synonymous with betterment.").

quo. Reflecting quite the opposite conception: "[T]he image of a continent tied up in primeval forest [became] a bogeyman; no one [would] have argued seriously that the clearing of frontier land should be regarded as waste."[197] Instead, waste came to mean a failure to reach developmental potential, and anti-waste measures shifted accordingly from usage-veto to market-facilitating.

For example, "in the nineteenth century . . . American judges beg[a]n to argue that the English law of [landlord–tenant] waste [was] inapplicable to a new, unsettled country because of its restraint on improvement of land."[198] Courts, thus, narrowed the doctrine of landlord–tenant waste as applied to wild lands and "jettisoned the waste doctrine's ban on clearing forest land for cultivation."[199] Instead, the new American version of landlord–tenant waste permitted tenants to alter land as consistent with "good husbandry," which essentially encouraged immediate economic development of the land.[200] Thus, the legal concept shifted from considering it wasteful to develop land against the wishes of a landlord to considering it wasteful to allow a landlord to stand in the way of development.[201] Moreover, changing the waste standard to pro-development reduced transaction costs for tenants seeking to make more valuable uses of property.[202]

During the same time period, the adverse possession doctrine emerged to encourage economic utilization of wild land, and also reflected a market-facilitating anti-waste measure.[203] While the doctrine may have originated to protect title,[204] "beginning in the nineteenth century, American courts serving the ideology of economic expansion reformulated adverse possession in the pursuit of national productivity."[205] To spur development, adverse possession became "a tool designed to transfer title to wild lands from the idle true owner to the industrious adverse possessor."[206] Similar to the modern landlord–tenant waste doctrines, this approach

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197. Purdy, *supra* note 7, at 676.

198. HORWITZ, *supra* note 159, at 3 (internal quotations omitted).

199. Sprankling, *supra* note 19, 535.

200. *See* HORWITZ, *supra* note 159, at 54, 58.

201. Not all landlord–tenant waste doctrines have evolved in such a way. In the case of waste to structures, a number of courts still hold that any change constitutes waste. *See, e.g.*, Brokaw v. Fairchild, 237 N.Y.S. 6 (Sup. Ct. 1929), *aff'd mem. per curiam*, 245 N.Y.S. 402 (App. Div. 1930), *aff'd mem. per curiam*, 177 N.E. 186 (N.Y. 1931). Other courts have allowed changes that enhance value. *See, e.g.*, Melms v. Pabst Brewing Co., 79 N.W. 738, 738 (1899); *see generally* Merrill, *supra* note 6. To the extent that the American doctrine of waste has allowed for good husbandry, it goes further toward meeting efficiency goals like those articulated by Richard Posner in suggesting that an efficient solution would be to allow a tenant to do what a rational owner would have incentive to do. *See* HORWITZ, *supra* note 159, at 54, 58; *see, e.g.*, Posner, *supra* note 7.

202. *See, e.g.*, Posner, *supra* note 7.

203. *See* Sprankling, *supra* note 192, at 820 ("Indeed, the limitations model is occasionally defended on the ground that such repose encourages the utilization of land."); *see also* POSNER, *supra* note 39, at 72–75 (discussing different methods for creating an efficient management strategy for divided-ownership estates).

204. *See* Sprankling, *supra* note 192, at 821 ("Land utilization is a muted, subordinate theme in a doctrine dominated by concern for title protection.").

205. Sprankling, *supra* note 192, at 821.

206. *Id.*

to adverse possession again reduced transaction costs that would otherwise impede the development of wild land. Further, by reducing the threshold for adverse possession "to the point where sporadic, inconspicuous activities sufficed to create title,"[207] courts ensured that "title to wild lands [could] be maintained only through progressive exploitation."[208] Thus, adverse possession encouraged economic progress by embracing a concept of "exploitative utilitarianism" that "equat[ed] preservation with waste."[209] In this way, adverse possession exemplified a market-facilitating measure in seeking to combat underuse by spurring development of financially valuable resource uses that would bring goods to the market.

Nineteenth-century laws encouraging the development of water mills offer another example of market-facilitating measures at work.[210] Relying on dams to harness waterpower, water mills served as an important energy source in early America.[211] However, because the dams created reservoirs that could flood adjacent properties, liability concerns stood in the way of mill construction. Thus, to promote development of water mills, states passed "mill acts" that limited flooding liability[212] and, thereby, lowered the transaction costs involved in creating mills. Justified on the basis of "an increase in total utility,"[213] these mill acts displayed economic-efficiency values and drove development to remedy the perceived underuse of water power.

Even earlier in American history, concern with the same concept of waste led to a market-facilitating approach in land dealings with Native Americans. For example, the Supreme Court's canonical 1823 decision in *Johnson v. M'Intosh* "defended the European conquest of America with the explanation that to 'leave (Native Americans) in possession of their country, was to leave the country a wilderness,' a consequence seemingly so abhorrent as to end debate."[214] Thus, the Court essentially justified European control of North America on the grounds that this result would better allow resources to flow to their most valuable uses (i.e. it would reduce transaction costs for development), and this line of reasoning again reflects the perception of waste as an unseized development opportunity.

These market-facilitating doctrines are not limited to early American law; modern resource doctrines continue to drive market development. For the most part, the adverse possession principle adopted in the nineteenth century still applies to wild land today,[215] and a similarly motivated doctrine applies to leases for oil and

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207. *Id.* at 817.
208. *Id.* at 840.
209. *Id.* at 856.
210. HORWITZ, *supra* note 159, at 47 (noting that "mill acts" represent "some of the earliest illustrations of American willingness to sacrifice the sanctity of private property in the interest of promoting economic development").
211. *See id.* at 49–50.
212. *See generally id.* at 47–49.
213. *Id.* at 49.
214. Sprankling, *supra* note 19, at 532 (quoting Johnson v. M'Intosh, 21 U.S. 543, 590 (1823)).
215. *See id.* at 520.

gas extraction on federal public lands.[216] To spur the development of marketable resources, the law will terminate leases unless leaseholders undertake exploration activities within a certain timeframe.[217] Moreover, until recently, government programs actively encouraged filling wetlands to transform them into more market-valuable agricultural land.[218] Similarly, some state and local property tax assessments rely on fair market value as determined by the highest and best use of land rather than its actual use,[219] creating an added incentive for development.

Market-facilitating measures also reflect an important self-correcting feature. Because the economic-efficiency conception of waste is the value underscoring market-facilitating anti-waste provisions, these provisions must adapt to address newly discovered market malfunctions, such as emerging information about unpriced externalities, transaction costs, or other barriers to efficient resource transactions.[220] Additionally, as newer resource uses or development methods arise, older market-facilitating measures may become outmoded if they continue to encourage earlier uses that have become less efficient and ultimately economically wasteful themselves.[221] Thus, to remain true to their underlying economic-efficiency values, market-facilitating anti-waste measures must remain dynamic in continuing to pursue the highest value resource uses.[222]

The continuing adjustment of the landlord–tenant waste doctrine demonstrates how market-facilitating measures can adapt. While the shift from the usage-veto doctrine to the market-facilitating doctrine first freed tenants to pursue higher value resource uses through "good husbandry,"[223] American courts have since refined the doctrine further in pursuit of market efficiency. For example, the American landlord–tenant waste doctrine formerly "held that any permanent destruction of a structure constituted waste, even if it improved the value of the parcel as a whole."[224] Now, however, economic value is the sole criterion many

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216. *See* 4 GEORGE C. COGGINS & ROBERT L. GLICKSMAN, PUBLIC NATURAL RESOURCES LAW § 39:28 (2d ed. 2007) ("Private oil and gas leases are structured to force the lessee to drill or forfeit the lease, a diligence requirement mostly, but not entirely, duplicated in the federal context").

217. *See id.*

218. *See* JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW AND POLICY 270, 280 (3d ed. 2010).

219. *See, e.g.*, FLA STAT. § 193.011 (2008).

220. *Cf. supra* notes 94–96 and accompanying text.

221. *See* HORWITZ, *supra* note 159, at 34; *cf.* POSNER, *supra* note 39, at 55 ("[A]lways to assign the property right to the prior of two conflicting land uses—would be inefficient, for the later use often will be the more valuable yet transaction costs may be prohibitive.").

222. *Cf.* HORWITZ, *supra* note 159, at 34 (describing the "effort to adapt private law doctrines to the movement for economic growth").

223. *See id.* at 54, 58.

224. Strahilevitz, *supra* note 73, at 2183.

states consider in determining landlord–tenant waste.[225] Accordingly, "an act that increases the value of property cannot constitute [landlord–tenant] waste."[226]

The evolution of water law regimes also illustrates how market-facilitating measures can adapt to serve market-efficiency goals. Initially, when nineteenth-century American courts needed to "resolve the tension between the need for economic development and the fundamentally antidevelopment premise of the common law,"[227] they abandoned the usage-veto natural-flow regime,[228] which effectively prohibited substantial water withdrawals. Courts instead adopted the market-facilitating doctrine of reasonable use, which allowed riparian property owners to withdraw water for reasonable use on a riparian tract.[229] By removing downstream owners' power to veto new water uses and allowing riparian owners to choose water uses based on market demand, the reasonable-use doctrine prevented waste by eliminating some of the economically inefficient limits on water diversion.[230]

However, because the reasonable-use doctrine tied water diversion rights to riparian property, it proved ill suited for efficient development of the arid western United States.[231] As a result, western states embraced the prior appropriation doctrine, which ties water rights to water use rather than to riparian land. Under the prior appropriation doctrine, one gains a water right by diverting water and putting it to beneficial use. As a result, the doctrine not only incentivizes development of water uses but also facilitates economic efficiency because water can be used where it is most valued, regardless of whether that use is on a riparian tract or not.

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225. *See, e.g.*, Merrill, *supra* note 6, at 1059 ("In practice [in landlord–tenant waste cases], economic value tends to dominate everything else. If the economic value goes up, this confirms what a normal owner would do and where the neighborhood is heading. If the value goes down, the opposite inferences are drawn.").

226. Strahilevitz, *supra* note 73, at 2183.

227. HORWITZ, *supra* note 159, at 36.

228. *See, e.g.*, Harris v. Brooks, 283 S.W.2d 129, 132–33 (Ark. 1955) (rejecting the natural-flow approach in favor of a reasonable-use regime).

229. *See, e.g.*, Mark S. Davis & Michael Pappas, *Escaping the Sporhase Maze: Protecting State Waters Within the Commerce Clause*, 73 LA. L. REV. 175, 184–85 (2012) ("Eastern riparian regimes . . . focus on maintaining water in watercourses and sharing in times of shortage. Riparian water rights stem not from diversion, but rather from ownership of a tract of land that abuts or contains a watercourse (i.e., a riparian tract). A riparian landowner traditionally has the right to make reasonable use of water on the riparian tract or within a prescribed distance from the watercourse so that return flows will ensure sufficient water for downstream users. In times of drought, all riparians share the burden of shortage; earlier users receive no favored status.").

230. *See* HORWITZ, *supra* note 159, at 37; Joseph Sax, *Proceedings of the 2001 Symposium on Managing Hawai'i's Public Trust Doctrine*, 24 U. HAW. L. REV. 21, 25–28 (2001).

231. *See, e.g.*, CHARLES F. WILKINSON, CROSSING THE NEXT MERIDIAN: LAND, WATER, AND THE FUTURE OF THE WEST 231–35 (1992). The reasonable use doctrine restricted the use of water to riparian tracts, and thus prevented the formation of markets for water use on other tracts. *Cf. id.*

Moreover, the prior appropriation doctrine makes explicit its underlying utilitarian-value structure by labeling unused water as "wasted."[232]

The development of oil and gas law also demonstrates an evolution of market-facilitating measures. As discussed above, potential liability under the *ad coelum* doctrine initially limited exploitation of oil and gas resources. In response, states universally moved to encourage oil and gas extraction by adopting the rule of capture, which limited *ad coelum* liability.[233] Under the rule of capture, "the owner of a tract of land acquires title to the oil and gas that is produced from wells drilled on the tract even if it can be shown that the oil or gas migrated from adjoining lands."[234] Thus, the rule of capture responded to perceived underuse of oil and gas resources by lowering the transaction costs of drilling.

This shift to the market-facilitating rule of capture certainly removed impediments to drilling, but it proved to be an incomplete measure because it created other economic inefficiencies. Under the rule of capture, the only option available to protect one's oil and gas from being drained by a neighbor was to drill one's own well and intercept the oil and gas.[235] This incentive structure essentially created a race to drill as many wells as close to property lines as possible, both to protect one's own reserves and to get any available share of a neighbor's. However, this caused two major problems: overdrilling and premature dissipation of the natural reservoir energy.[236] This incentive to drill also flooded the market, causing a distortion by increasing supply and thereby depressing prices.[237] In economic terms, these problems created deadweight losses and rent erosion,[238] resulting in higher costs of production and an inability to extract all the available oil and gas from the reservoir.[239]

In response to these new inefficiencies, the economically oriented market-facilitating measures adjusted. States adopted conservation regulations that imposed well-spacing requirements, limiting the number of wells over a reservoir, thereby preventing overdrilling and premature dissipation of reservoir energy. Additionally, states imposed "production allowables"[240] to limit oil and gas production, and to

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232. *See, e.g.*, RASBAND ET AL., *supra* note 56, at 747; 62 CAL. JUR. 3D *Water* § 33 (2005) ("The policy of the state courts may be summarized to be that the rivers and streams of the state that *waste into the sea* should, if possible, be conserved for beneficial uses, and that this should be done with full recognition of the rights the riparian owners may properly assert.") (emphasis added).

233. KRAMER & MARTIN, *supra* note 172, at § 3.02.

234. *Id.* at § 2.01.

235. *See id.* at Scope, § 2.01.

236. This is an example of rent erosion in which a lack of defined property rights led to wasteful expenditures seeking to capture the value of oil and gas. *Cf.* IPPOLITO, *supra* note 35, at 136.

237. *See, e.g.*, Patrick H. Martin, *The Establishment of Allowables for Production of Gas in Louisiana*, 57 U. COLO. L. REV. 267, 268, 270 (1986).

238. *See* discussion *supra* Part II.B.1.

239. KRAMER & MARTIN, *supra* note 172, at § 2.02.

240. *See generally* Martin, *supra* note 237, at 267–68 (discussing production allowables as legal measures to prevent waste of oil and gas resources by limiting production of these resources in certain circumstances).

prevent the "economic waste" that had resulted from the low prices of flooded markets.[241] These regulations still promoted oil and gas development, but by reducing deadweight losses, they remained true to the anti-waste value of economic efficiency.[242]

Oil and gas doctrines continued to evolve in pursuit of economic-efficiency as states imposed additional regulations to reduce the transaction costs associated with divided ownership of oil and gas reservoirs. Since reservoir shapes do not necessarily track surface-property boundaries, often a reservoir underlies multiple tracts.[243] In such cases, the most efficient way to extract the oil and gas may involve well placement that does not correspond with property lines, but rather requires landowners to cooperate in a single well or series of wells.[244] However, because assembly problems or bilateral monopolies[245] frequently prevented economically efficient cooperation in drilling efforts,[246] states enacted compulsory pooling and unitization schemes that could force separate landowners to cooperate.[247] These anti-waste schemes, which are still in operation today, compromise owner autonomy to promote economically efficient development of oil and gas resources.[248]

C. Sustainability Measures

Finally, sustainability measures constitute a third type of anti-waste laws, and they typically stem from a perceived resource context of concern about overuse. Rather than serving a single primary societal value, however, sustainability measures respond to a pluralist[249] set of values including human flourishing, future generations, and ecology.

Informed by these societal values, sustainability measures fundamentally differ from market-facilitating measures by identifying waste not according to economic-efficiency metrics but rather in terms of retaining options for immediate and future human and ecological needs. Moreover, sustainability measures differ

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241. *See, e.g.*, *id.* at 268; *cf.* ASCHER, *supra* note 63, at 8 ("For resource extraction, the value of the resource can be squandered by extracting and selling it at the wrong times (e.g., when the prices are too low) or by extracting it with excessive losses (e.g., pumping oil out too rapidly leaves more in the ground; reckless timber harvesting can cause great damage to other trees). These are essentially conservation issues, assessed in terms of both getting the greatest economic value out of the resource endowment . . . . ").

242. *See, e.g.*, Martin, *supra* note 237, at 268.

243. *See generally* KRAMER & MARTIN, supra note 172, at § 3.02.

244. *See generally id.*

245. *See, e.g.*, MERRILL & SMITH, *supra* note 13, at 39.

246. *See* Michael Pappas, *Energy Versus Property*, 40 FLA. ST. U. L. REV. 435 (2014) (describing how tract owners do not cooperate in pooling even when it is in their economic best interests).

247. Pooling and unitization could also be voluntary. *See id.* at 467–68.

248. *See id.* at 465–68 (discussing how these compulsory pooling and unitization schemes compromise otherwise protected property rights in the name of driving development of energy resources).

249. *See, e.g.*, Davidson, *supra* note 149, at 1600 ("Pluralism in property theory eschews singular narratives in understanding property law, focusing instead on the varied and often competing normative and instrumental concerns embodied in the institution."); *see also* Dagan, *supra* note 53; Purdy, *supra* note 7, at 655.

from usage-veto measures because rather than seeking to preserve stability or continuity in resource uses, sustainability measures may call for changes in settled resource uses to encourage immediate and extended productivity. So, while sustainability measures and usage-veto measures might both seek to avoid overuse, they differ in their underlying conception of waste. And though both usage-veto and sustainability measures may sometimes lead to a form of resource preservation, their different underlying values will frequently call for differing approaches to resource management.

The Endangered Species Act ("ESA") offers a prime example of a sustainability measure aimed to protect against the waste of species and biodiversity. Concerned with species extinction, a rather extreme form of overuse, the ESA protects listed species by requiring that federal actions not jeopardize continued species existence and by prohibiting all persons from harassing, harming, killing, or otherwise "taking" these species.[250] Though these protections can be quite costly, the ESA explicitly disallows cost-benefit analysis in determining which species are covered; the statute requires that decisions to list species as protected rely solely of biological risks to the species.[251] Thus, the ESA intentionally eschews economic efficiency valuation based on willingness to pay.[252] Instead, it protects different species based on ecological concerns for biodiversity and ecosystem health as well as urgent human-flourishing and future-generations concerns, such as the possibility of biodiversity providing a source for future medicines or helping contribute to food security.[253]

Other environmental statutes incorporate similar sustainability measures that respond to ecosystem, human flourishing, and future generations values rather than a willingness to pay. For example, the Clean Water Act ("CWA") 404(b) permit system limits wetland development in order to achieve "no net loss" of wetlands function.[254] Thus, it considers draining or filling wetlands a form of waste, even when markets value other uses—such as development—over wetlands conservation.[255] Driven by concerns other than economic-efficiency, the CWA preserves wetlands to provide for current and future human flourishing needs, such

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250. *See* 16 U.S.C §§ 1536, 1538 (2012).

251. *See* 16 U.S.C. § 1533; *cf.* Tenn. Valley Auth. v. Hill, 437 U.S. 153, 185–87 (1978) (cost-benefit analysis of protecting endangered species was inappropriate because Congress viewed the value of determined species as "incalculable.").

252. *See, e.g.*, Holly Doremus, *Patching the Ark*, 18 ECOLOGY L.Q. 265, 275–81 (1991) (discussing the faults of utilitarian and cost-benefit arguments for preservation).

253. *Cf.* RASBAND ET AL., *supra* note 56, at 330–32.

254. *See* 33 U.S.C. § 1344 (2012); SALZMAN & THOMPSON, *supra* note 218, at 270–71.

255. In fact, as discussed earlier, the development-driving Swampbusters program subsidized the filling of wetlands to encourage higher-value land uses. *See* SALZMAN & THOMPSON, *supra* note 218, at 270.

as filtering contaminants from water and reducing flood risks,[256] as well as ecological integrity.[257]

In the same vein, the Magnuson–Stevens Act ("MSA") manages federal fisheries to provide an "optimum yield" that will allow for the continued production of fisheries resources without a depletion of wild fish stocks.[258] The MSA also calls for fishing practices to avoid "bycatch," the catch and destruction of nontarget species.[259] Both of these principles seek to avoid wasting fisheries' resources out of concern for both food availability and ecosystem function.

In the context of water law, the relatively recent development of instream flow provisions reflects another sustainability anti-waste measure. Recognizing that excessive water diversions threaten the ecological integrity of many watercourses, some states have enacted in-stream flow laws requiring that a certain minimum amount of water remain in its natural watercourse. Moreover, certain states even complement these minimum-instream flow provisions with laws that allow nonprofits to hold additional instream flow rights for conservation purposes. These provisions aim to prevent waste in the form of ecosystem destruction and its attendant impacts on present and future generations. In doing so, these sustainability measures respond to a concept of waste in a fundamentally different way than that underlying the market-facilitating prior-appropriations doctrine, which had formerly condemned water flowing undiverted in a stream as waste.[260]

Not all sustainability measures are of such recent vintage. Decades before the enactment of most of the environmental statutes in the 1970s, wildlife management laws employed sustainability anti-waste principles.[261] For example, both state and federal wild game laws sought to ensure stable populations of game by setting hunting limits[262] and restricting the markets for the sale of game.[263]

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256. *See, e.g.*, *id.* at 269–70. These wetlands functions of filtering contaminants and reducing flood risks can also be described as "ecosystem services." *See, e.g.*, James Salzman et al., *Protecting Ecosystem Services: Science, Economics, and Law*, 20 STAN. ENVTL. L.J. 309, 310–12 (2001). Because these ecosystem services are essentially unpriced-benefits of natural environments, scholarship has explored methods for building markets for ecosystem services. *See, e.g.*, *id.* This approach obviously employs an economic-efficiency value, and legal measures fostering ecosystem service markets could be seen as market-facilitating anti-waste measures. However, the CWA currently does not take such an approach, instead using a command-and-control restriction on wetlands development that, as discussed above, reflects a sustainability measure.

257. *See* SALZMAN & THOMPSON, *supra* note 218, at 270.

258. *See* 16 U.S.C. § 1851 (2012).

259. *See id.*

260. *See, e.g.*, RASBAND ET AL., *supra* note 56, at 747; 62 CAL. JUR. 3D *Water*, *supra* note 232, at § 33 ("The policy of the state courts may be summarized to be that the rivers and streams of the state that *waste into the sea* should, if possible, be conserved for beneficial uses, and that this should be done with full recognition of the rights the riparian owners may properly assert.") (emphasis added).

261. *See, e.g.*, The Migratory Bird Treaty Act, 16 U.S.C. § 703 (2012).

262. *See, e.g.*, *id.*; *Conservation Commission of Missouri*, MDC ONLINE, http://mdc.mo.gov/hunting-trapping/deer-hunting/missouri-deer-hunting-history (last visted July 12, 2014).

263. *See, e.g.*, RASBAND ET AL., *supra* note 56, at 344–45.

Additionally, federal and state laws expressly prohibit "wanton waste" of game,[264] effectively codifying Locke's disapproval of killing an animal and leaving it to rot in the woods.[265]

Earlier still, sustainability measures displaced some markets to ensure that important resources would be available for urgent needs. For example, "in 1817 the [federal] government had reserved for naval construction public lands containing live oak and red cedar and in 1832 had reserved Hot Springs, Arkansas because of its perceived medicinal value."[266] Similarly, resource concerns during World War II led to rationing regulations, which sought to preserve resources for the war efforts and provide an equitable distribution of consumer goods by curbing perceived wasteful nonurgent consumption.[267]

IV. APPLYING THE WASTE FRAMEWORK

The previous Parts synthesized property and resource doctrines into a framework for understanding legally cognizable waste concepts and anti-waste laws. As detailed above, legally cognizable waste arises through the combination of perceived resource context and specific societal values, and anti-waste provisions respond to legally cognizable waste through usage-veto, market-facilitating, or sustainability measures. These consistent responses show that anti-waste provisions are more than ad hoc, sui generis resource laws. Rather, by surveying different time periods, resources, and circumstances, one finds that legal conceptions of waste and anti-waste measures follow a coherent framework.

This Part explores the practical and theoretical implications of the waste framework. First, at a practical level, the framework offers a tool for understanding and analyzing individual anti-waste measures. By identifying the contexts and values that anti-waste provisions serve, the framework establishes criteria to evaluate the effectiveness of any particular anti-waste law. Second, on a more abstract level, the framework provides an overarching appreciation of how waste

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264. *See, e.g.*, 50 C.F.R. § 20.25 (2001). Though not all states use the term "wanton waste," most prohibit some variation of the concept.

265. *See supra* note 25 and accompanying text.

266. *See* RASBAND ET AL., *supra* note 56, at 129–30. These early sustainability measures are no longer in place, which helps demonstrate that anti-waste measures do not necessarily follow a linear progression from one to another. That is to say, not every usage-veto measure will eventually lead to a sustainability measure, and sustainability measures are not necessarily the end-point of some anti-waste arc. Rather, anti-waste measures shift in response to changing perceived resource contexts and specific societal values. If a resource does not appear to be overused or underused, then there is no longer a need for an anti-waste provision and it will be abandoned, as were the provisions protecting the live oak and red cedar for naval construction.

267. *See* ROBERT JAMES MADDOX, THE UNITED STATES AND WORLD WAR II, 193–94 (1992); HARVEY C. MANSFIELD, A SHORT HISTORY OF OPA 156 (1947); ARCHIE SATTERFIELD, THE HOME FRONT: AN ORAL HISTORY OF THE WAR YEARS IN AMERICA: 1941–45, 208–09 (1981); Robert Higgs, *The Two-Price System: U.S. Rationing During WWII*, FREEMAN (April 29, 2009), http://www.fee.org/the_freeman/detail/the-two-price-system-us-rationing-during-world-war-ii.

concepts fit into broader property principles and how anti-waste provisions work cumulatively to inject adaptability into property law.

A. Analyzing Anti-Waste Provisions

Anti-waste provisions are only effective if they address current instances of legally cognizable waste. Thus, anti-waste laws must respond to changes in perceived resource contexts and societal values.[268] If anti-waste measures fail to do so, they may become ineffectual or, worse yet, may actually cause legally cognizable waste rather than prevent it.[269] As a result, it is essential to periodically reassess waste conceptions and anti-waste provisions.[270] The waste framework offers a tool for doing so, first by considering whether perceived resource context and specific societal values have changed, and second, by considering whether anti-waste measures have responded to these changes. The following Subparts offer examples of such analyses in light of current circumstances.

1. Analyzing Changes to Perceived Resource Contexts and Societal Values

Relatively recently, perceived resource contexts and societal values may have shifted sufficiently to call into question the continued applicability of many anti-waste measures.

In terms of perceived resource context, there is a growing perception of limitation and overuse of many historically exploited resources, while at the same time, alternative resources are perceived as underused. There has been an increased recognition of the limits of our world's finite resources.[271] In terms of traditionally exploited water, land, fossil fuel, and wildlife resources, "[t]he nineteenth century vision of endless abundance faded long ago."[272] On top of that, climate change will likely impose further strains on these resources: dry areas are expected to get drier,[273] rising sea levels threaten coastal wetlands,[274] and temperature changes endanger the survival of more species.[275] Moreover, there is growing appreciation for how these historic resources impact each other, such as the link between oil and

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268. *Cf.* Freyfogle, *supra* note 23, at 80 ("[T]he calculus of liberty could well change over time as populations rise, resources decline, and public values evolve.").

269. This was the case with the rule of capture leading to inefficient oil and gas development. *See* discussion *supra* notes 236–40 and accompanying text.

270. *Cf.* Freyfogle, *supra* note 23, at 115 ("How private property's effects are evaluated overall—what is considered a cost, what a benefit, and how they all sum up—depends on the surrounding society, with its circumstances, values, and hopes. Change the society, change the circumstances and values, and a property system that once made sense might no longer do so.").

271. *See, e.g.*, Sprankling, *supra* note 192, at 857–58.

272. *Id.*

273. *See, e.g.*, Robin Kundis Craig, *Adapting to Climate Change: The Potential Role of State Common-Law Public Trust Doctrines*, 34 VT. L. REV. 781, 786 (2010) (discussing climate change impacts on water resources).

274. *See, e.g.*, J. Peter Byrne, *The Cathedral Engulfed: Sea Level Rise, Property Rights, and Time*, 73 LA. L. REV 69, 70–71 (2012).

275. *See, e.g.*, RASBAND ET AL., *supra* note 56, at 325.

gas exploitation and habitat destruction[276] or the challenges of balancing water use and energy production.[277] These examples evidence an increasing perception that traditionally exploited resources are being overused.

While these traditionally harnessed resources are increasingly perceived as overused, there is also an increased awareness of resources and opportunities that are underused. Renewable energy is a prime example. While development of renewable resources certainly impacts other resource use,[278] the widely held and increasing perception is that renewable energy is underdeveloped.[279] Similarly, energy efficiency, for example, the concept of the negawatt as a conceptual measure of power capacity available though energy saved,[280] and water reuse or increased water efficiency[281] are resource deployments with perceived room to grow.[282]

In conjunction with this change in perceived resource context, there is also evidence of a shift in societal values, including a greater appreciation for human flourishing, future generations, and ecological concerns. For example, the rising recognition of ecosystem services[283] embraces not only ecological values but also the urgent human needs served by healthy ecosystems that, for example, provide flood control, productive soil, and beneficial pollinating insects.[284] Moreover, the environmental justice movement shows a focus on both ecological and human flourishing values.[285] John Sprankling has described a similar shift in terms of attitudes toward wilderness:

> Two centuries of development have radically transformed our national attitude toward wilderness. For the pioneer, an ancient forest on future farmland had a negative value; it was an obstacle to be conquered before cultivation could begin. Wilderness preservation in such circumstances would have been economic and social heresy.

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276. *See, e.g.*, *New Study Estimates Impacts of Oil and Gas Development on Sage-grouse*, WILDLIFE MGMT. INST., https://www.wildlifemanagementinstitute.org/index.php?option=com_content&view=article&id=402:new-study-estimates-impacts-on-sagegrouse&catid=34:ONB+Articles&Itemid=54 (last visited July 12, 2014).

277. *See, e.g.*, *Water Energy Nexus: A Literature Review*, WATER IN THE WEST (Aug. 2013), http://waterinthewest.stanford.edu/sites/default/files/Water-Energy_Lit_Review.pdf.

278. Uma Outka, *The Renewable Energy Footprint*, 30 STANFORD ENVTL. L.J. 241, 253–54 (2011).

279. *See, e.g.*, Pappas, *supra* note 246, at 437.

280. *See, e.g.*, *The Elusive Negawatt*, ECONOMIST (May 8, 2008), http://www.economist.com/node/11326549.

281. *See, e.g.*, *Water Reuse Frequently Asked Questions*, WATEREUSE ASS'N, https://www.watereuse.org/information-resources/about-water-reuse/faqs-0 (last visited July 12, 2014).

282. *See generally*, ECONOMIST, *supra* note 280; WATEREUSE ASS'N, *supra* note 281.

283. *See, e.g.*, Salzman, *supra* note 256, at 310–12.

284. *See id.*

285. *See, e.g.*, *Environmental Justice*, EPA, http://www.epa.gov/compliance/ej/index.html (last visited July 12, 2014).

> Today, in contrast, our society values wilderness for both moral and utilitarian reasons.[286]

Though focused on wilderness, Sprankling's observation can be generalized in terms of how societal values regarding resources have become more pluralistic and diversified.[287]

While these shifts in perceived resource context or societal values may be subtle or gradual, they can greatly impact conceptions of waste and the effectiveness of anti-waste measures. The waste framework provides a means for understanding the ramifications of these shifts and, as discussed in the next section, how anti-waste laws might remain current in response to them.

2. Analyzing Particular Anti-Waste Measures

If resource levels have changed, societal values have changed, and the climate is changing, then anti-waste measures too are due for a change. This Subpart examines a selection of anti-waste measures for responsiveness to possible changes in perceived resource contexts and societal values. The few examples considered below are far from exhaustive, but they provide generalizable models of analysis for reevaluating other anti-waste laws.

First, market-facilitating measures can become outdated when they continue to govern resources that are no longer perceived to be underused or for which the primary societal value is not limited to economic-efficiency concerns. For example, the market-facilitating adverse possession doctrine is no longer appropriate for wild lands because "[t]he need to encourage wilderness development . . . no longer exists in the United States."[288] Nonetheless, "[t]oday, despite a fundamentally different national landscape, the property-law system still actively facilitates the despoliation of our scattered wilderness remnants."[289] Thus, because wild lands are no longer perceived to be underused, a market-facilitating approach is no longer necessary. Additionally, societal values in wild lands appear to include more concerns than just economic efficiency.[290] Accordingly, adverse possession's market-facilitating approach to wild lands is no longer appropriate, and the law should shift instead towards a regime more consistent with current perceived resource contexts and values. Thus, if wild lands are in fact thought to be overused, then a sustainability measure or a usage-veto[291] would be appropriate, depending on

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286. Sprankling, *supra* note 19, at 584–85.

287. *See id.*

288. *See id.*; *see also* Larissa Katz, *The Moral Paradox of Adverse Possession: Sovereignty and Revolution in Property Law*, 55 MCGILL L.J. 47, 63 (2010) ("Others point out that it is no longer self-evident that adverse possession leads to more efficient uses of land because our society no longer straightforwardly prefers development and active uses of land over conservation and passive uses. Not being able to locate the benefits of adverse possession for deliberate squatters in utilitarian terms, American courts and commentators have become increasingly responsive to what they see as the moral paradox of adverse possession.").

289. Sprankling, *supra* note 19, at 557.

290. *See, e.g.*, Sprankling, *supra* note 192, at 816 ("This 'development model' is fundamentally antagonistic to the twentieth century concern for preservation.").

291. Sprankling has offered something akin to a usage-veto measure for remedying this problem. He suggests that the law should respect private sanctuaries like conservation

the prevailing societal value. If, instead, the current perception of wild lands is neither overuse nor underuse, but rather satisfactory use, then no anti-waste measure would be necessary.

Market-facilitating measures may also become outdated when they fail to adjust themselves to address economic inefficiencies, such as unpriced externalities, in resource uses.[292] In such instances, market-facilitating approaches may still accurately reflect perceived resource underuse and prevailing economic-efficiency values, but the particular measures may need adjustment to address market failures. The current practice in oil and gas extraction demonstrates how these market-facilitating measures promoting oil and gas development[293] have failed to account for economic waste during resource extraction and, thus, need updating to ensure efficiency.

To take one example, hydraulic fracturing in North Dakota's Bakken Shale has produced an enormous amount of oil[294] and natural gas.[295] However, rather than capturing the natural gas, which requires paying for pipelines and processing plants, extractors opt for the cheaper solution of simply burning the gas through "flaring."[296] This gets rid of the natural gas and allows extractors to more cheaply capture the oil, which is more valuable.[297] Flaring is essentially unregulated, and while it is less destructive than simply allowing the natural gas to escape into the atmosphere, the process still emits 2 million tons of carbon dioxide into the atmosphere each year, or enough energy to heat 500,000 homes.[298] Outside of North Dakota less than 1% of natural gas is flared off, but within the state, 34% was flared in 2012, resulting in North Dakota's greenhouse gas emissions for flaring alone equaling those of 2.5 million cars.[299] Moreover, in addition to the flaring on the Bakken Shale, natural gas wells throughout the country leak large quantities of methane—a potent greenhouse gas—into the environment.[300]

Flaring and leaking of natural gas creates a form of waste that anti-waste measures must adapt to address. Assuming that market-facilitating measures are still

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easements by "exemption of privately-owned wild lands from adverse possession." *Id.* at 863.

292. *See* discussion *supra* notes 236–40 and accompanying text.

293. *See* discussion *supra* notes 241–48 and accompanying text.

294. *Bakken Shale Oil Formation*, BAKKEN SHALE, http://bakkenshale.com/ (last visited July 21, 2013).

295. *See, e.g.*, Clifford Krauss, *In North Dakota, Flames of Wasted Natural Gas Light the Prairie*, N.Y. TIMES (Sept. 26, 2011), http://www.nytimes.com/2011/09/27/business/energy-environment/in-north-dakota-wasted-natural-gas-flickers-against-the-sky.html?pagewanted=all&_r=1&.

296. *See id.*

297. *See, e.g.*, *id.*

298. *See id.*

299. *See* Stephen Mufson, *In North Dakota, the gritty side of an oil boom*, WASH. POST, (July 18, 2012), http://www.washingtonpost.com/business/economy/in-north-dakota-the-gritty-side-of-an-oil-boom/2012/07/18/gJQAZk5ZuW_story.html.

300. *See, e.g.*, *Methane-spewing "super-emitters" stay out of gas study's spotlight*, ENERGWIRE, (September 18, 2013), http://www.eenews.net/energywire/2013/09/18/stories/1059987397.

appropriate for oil and gas resources, i.e., assuming that oil and gas is still perceived as underdeveloped and societal values regarding oil and gas still primarily reflect economic-efficiency concerns, then the relevant waste to address is the unpriced externality caused by flaring and leakage.[301] Currently oil and gas extractors do not pay for the environmental costs that these practices cause, and, as a result, the costs of producing oil and gas are artificially depressed.[302] As a result, the current oil and gas anti-waste measures do not serve their underlying economic-efficiency values because they have not corrected this pricing failure in oil and gas extraction. The solution, then, is to adjust market-facilitating measures to internalize the full costs of oil and gas production, just as market-facilitating oil and gas doctrines corrected the market inefficiencies initially caused by the rule of capture.[303]

It is not only market-facilitating measures that require reexamination, however. Usage-veto provisions can also fall out of step with perceived resource contexts and societal values. The no-harm rule for water law has been criticized in this regard. The rule currently protects stability and continuity of water uses by preventing transfer of water rights or changes in water uses that would harm downstream appropriators. However, economic-efficiency based arguments for water markets contend that the no-harm rule ossifies current inefficient water uses at the expense of conservation or reallocation of water. This debate amounts to a difference in values regarding water: for those favoring continuity, particularly of cultural identity for agricultural communities that use the water, the no-harm rule has appeal; whereas those in favor of economic efficiency would prefer to see the no-harm rule replaced with a market-facilitating measure that encourages gainful trades of water. While it is beyond the ambition of this Article to resolve whether actual societal values tip in favor of preserving or repealing the no-harm rule, the controversy underscores the need to periodically reexamine anti-waste provisions, and this anti-waste framework clarifies the scope of the debate.

Sustainability measures, too, require reexamination to ensure that they still match perceived resource contexts and societal values. For example, oak and cedar trees reserved for naval construction, or the resources subject to rationing during

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301. From the standpoint of a human-flourishing value, there may also be waste in flaring or leaking the gas instead of using it to heat 500,000 homes because the urgency of providing heat is greater than the urgency of cheaply burning off gas. Adopting this human flourishing value, however, would necessitate abandoning the development-driving framework and possibly adopting a sustainability measure instead. If this human-flourishing concern is an accurate reflection of prevailing societal value, then oil and gas anti-waste provisions would need to make such a shift. However, if economic efficiency is still the primary societal value used to measure waste of oil and gas resources, i.e., if development-driving measures are still appropriate, then flaring gas rather than using it to heat homes is not necessarily wasteful. Assuming that all costs have been internalized, if the opportunity cost in capturing and processing the gas is greater than the benefit of flaring the gas and more quickly extracting the more-valuable oil, then it is economically efficient to flare the gas instead of heating homes with it. Thus, from an economic standpoint, there would not be waste. This same line of thinking appears to animate the flaring practice on the Bakken Shale; however, as discussed in the main text above, not all costs have been internalized, so there is market inefficiency leading to economic waste.

302. *See* ASCHER, *supra* note 63, at 16.

303. *See* discussion *supra* notes 236–40 and accompanying text.

World War II, no longer require sustainability anti-waste protections because values have shifted, or because perceived-resource contexts cease to cause concern with overuse. Some scholars have suggested that modern sustainability measures, such as the ESA,[304] should also give way and shift to embrace economic-efficiency values.[305] Again, though this Article does not aspire to pass on the merits of these proposals, it hopefully clarifies what is at stake by grounding them in the context of the broader legal anti-waste structure.

Finally, perceived-resource contexts and societal values may call for new anti-waste measures for resources that have previously been unaddressed. To take one example, anti-waste measures appear appropriate to encourage distributed generation renewable-energy projects.[306] Distributed generation sources are on-site electrical generation facilities linked closely with their ultimate uses; solar panels or windmills on urban rooftops are frequently used examples.[307] Since renewable energy is largely perceived as underused and underdeveloped, and these distributed generation projects can offer great societal advantages,[308] failing to develop these projects could constitute a form of waste under a variety of values, including economic efficiency, human flourishing, future generations, and ecological concerns.[309] However, a market-facilitating anti-waste structure appears most suited to the current condition of distributed generation, particularly given the market failures that currently stand in the way of distributed-generation development.[310] Thus, just as the mill acts instituted a mechanism to increase water power production, a development-driving regime may be appropriate to combat the underuse of distributed generation of renewable energy.[311] Like the prior appropriation doctrine considered any undiverted water reaching the ocean to be wasted, so might the law consider it wasteful to allow any unused sunlight to hit a rooftop.

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304. It is worth noting that the ESA provides a measure for updating itself in regard to perceived-resource context. Since the ESA only protects listed endangered species, the process of listing and de-listing species responds to perceived scarcity of particular species. *See generally* Endangered Species Act, 16 U.S.C. § 1533 (2012); *see also Successful Recovery Efforts Prompt Service Proposal to Delist Gray Wolf and Focus ESA Protection on Mexican* Wolf, U.S. FISH & WILDLIFE SERV. (Feb. 12, 2013), http://www.fws.gov/home/wolfrecovery/.

305. Additionally, sustainability measures may become outdated if societal values shift away from human flourishing, future generations, or ecological concerns. For an example of how the Endangered Species Act might change if premised on economic concerns rather than these sustainability values see, e.g., Thompson, *supra* note 103.

306. *See* Pappas, *supra* note 246, at 477. While this paragraph focuses on distributed generation renewable energy projects, the same argument may be made for microgrids, energy efficiency measures, water efficiency measures, and water reuse measures.

307. *See id.;* Outka, *supra* note 278, at 245.

308. *See* Pappas, *supra* note 246, at 439–41.

309. *Cf. id.*

310. *See id.*

311. *Cf. id.*

B. Adaptability of Waste

In addition to offering a tool for analyzing individual anti-waste doctrines, the waste framework provides broader insight regarding how anti-waste provisions function collectively and cumulatively. This perspective highlights waste's role as an adaptable element in our property system.

Legally cognizable waste responds to the inputs of perceived resource context and specific societal values, and as these inputs change, so do conceptions of waste and attendant anti-waste measures. The examples discussed in Part III detailed how over time various different anti-waste regimes might govern the same resource (as with landlord–tenant waste), how a single resource (such as water) may have various aspects managed through different anti-waste measures, and how some resources (such as historic naval reserves of oak and cedar trees) may no longer require anti-waste provisions.

As a result of this variability, anti-waste measures are less predictable than other property doctrines, which generally provide lasting, stable[312] expectations.[313] This decreased predictability comes with a cost: anti-waste measures can disturb reliance interests and expectations or even shift entitlements altogether.[314] This variability also brings benefits, however. While most property doctrines do not react nimbly to new or changing resource scenarios,[315] relatively mercurial anti-waste provisions are more responsive, shifting with context and values. Thus, it is unsurprising that, over the American legal experience, the core concepts of property have not changed nearly as drastically as have conceptions of waste and anti-waste measures.[316] By responding to changing contexts and values, anti-waste measures inject property law with an element of adaptability.

By considering legal waste holistically and revealing cross-cutting characteristics like adaptability, the waste framework provides a vantage for assessing how waste informs other veins of property, environmental, and natural resource law. For example, it contributes a new consideration to the body of literature addressing how property rights develop and change over time.[317]

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312. *See, e.g.*, Katz, *supra* note 288, at 49 ("Property law is remarkably stable over time. Innovations in the form and content of ownership, for instance, are few and slow to catch on."). That is not to say that property law is static. *See, e.g.*, Davidson, *supra* note 149, at 1604–18 (discussing the dynamism of the numerus clausus).

313. As Jeremy Bentham proclaimed, property is "nothing but a basis of expectation." J. BENTHAM, THEORY OF LEGISLATION, PRINCIPLES OF THE CIVIL CODE pt. 1, ch. 8, at 68 (Baxi ed., Hildreth trans. 1975).

314. These shifts may offend a sense of fairness, as with adverse possession or mill acts. As discussed below, they may also inform thoughts about Fifth Amendment Takings.

315. *See, e.g.*, discussion *supra* Part III.A (documenting the initial experience with the *ad coelum* doctrine and oil and gas development).

316. If anti-waste measures shift expectations too quickly or fundamentally, they may cause a Fifth Amendment taking of property. However, fuller discussion of the takings implications of anti-waste provisions will be reserved for another article.

317. *See generally, e.g.*, GARY D. LIBECAP, CONTRACTING FOR PROPERTY RIGHTS 4–28 (1989); Demsetz, *supra* note 17, at 354–59; James E. Krier, *Evolutionary Theory and the Origin of Property Rights*, 95 CORNELL L. REV. 139 (2009); Saul Levmore, *Two Stories About the Evolution of Property Rights*, 31 J. LEGAL STUD. 421 (2002).

Similarly, since the adaptability of waste laws can shift property expectations, the waste framework informs regulatory-takings questions such as when alterations to property expectations trigger compensation.[318] A global understanding of waste also contributes to environmental and natural resource scholarship. For example, since shifting anti-waste provisions illustrate "a management policy framework every bit as dynamic as the [resources] it seeks to manage,"[319] the adaptability of anti-waste links with concepts of "adaptive management"[320] of natural resources. Finally, the adaptability of anti-waste provisions resonates with scholarship aimed at reconciling climate change adaptations with property expectations.[321] Thus, the anti-waste framework offers a tool for theoretical, as well as practical, analysis.

CONCLUSION

Anti-waste measures harness the contested concept of waste to create adaptable laws that steer property uses. Despite the seemingly disparate nature of individual anti-waste laws, they define waste according to the common factors of perceived resource context and societal values. Anti-waste laws then address waste through three distinct regimes: usage-vetoes, market-facilitating measures, and sustainability measures. Understanding anti-waste laws in light of this framework allows for critical evaluation of their practical effectiveness and theoretical implications.

318. *See generally, e.g.*, J. Peter Byrne, *Rising Seas and Common Law Baselines: A Comment on Regulatory Takings Discourse Concerning Climate Change*, 11 VT. J. ENVTL. L. 625, 642 (2010); Pappas, *supra* note 246; Sax, *supra* note 153, at 1447–48; Barton H. Thompson, Jr., *Judicial Takings*, 76 VA. L. REV. 1449, 1449–50 (1990).

319. *See generally* Robert L. Fischman & J.B. Ruhl, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424, 428 (2010).

320. *Id.* at 427–29.

321. *See generally, e.g.*, Byrne, *supra* note 274; Margaret E. Peloso & Margaret R. Caldwell, *Dynamic Property Rights: The Public Trust Doctrine and Takings in a Changing Climate*, 30 STAN. ENVTL. L.J. 51, 61–63 (2011); Joseph Sax, *Some Unorthodox Thoughts About Rising Sea Levels, Beach Erosion, and Property Rights*, 11 VT. J. ENVTL. L. 641 (2010).

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