EXTERNAL COSTS, COMMON POOLS, AND PUBLIC GOODS: RELATING THE PROPERTY RIGHTS ANALYSES OF COASE, OSTROM, AND SAMUELSON

Tilman Hartley, University of Bristol, March 2016.

ABSTRACT

The consensus among legal theorists is that property rights are not absolute but are a matter of degree. Numerous economic, political, and social theories, however, still rest upon an absolutist conception of property. In this paper, I set out a brief history of the recent property debates, and argue that rejecting an absolute conception of property leads to an important rethinking of the way that external costs, common pool resources, and public goods can be theorized. Importantly, applying a non-absolute conception of property to these theories reveals new ways in which they are related: with external costs construed as the assertion of the right to exclude others from certain rival resources, the 'tragedy' of resource overuse can be understood as the assertion of the right to exclude those who can no longer access a resource due to its depletion. On this analysis, the cause of resource overuse 'tragedies' is not a lack of property rights, as is often claimed, but the excessive concentration of such rights. Comparing rival and nonrival resources, and examining how nonrival resources become classified as club goods or as public goods, further emphasises the importance of social and political arrangements in defining property rights systems capable of preventing both the underprovision and the overuse of resources.

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INTRODUCTION

Legal scholars are now broadly agreed: there is no such thing as absolutely private property. In this paper, I explore some of the consequences of this striking conceptual shift. I begin in Part I by outlining the reasoning behind this new consensus, and argue

that rejecting an absolutist conception of property leads to the collapse of the dichotomy between private property and other kinds of property rights. In Parts II, I argue that this collapse means that resource overuse 'tragedies' can be analysed as a particular kind of external cost, in Part III show how this affects our understanding of external costs, and in Part IV argue that, as a result, insights from commons scholarship can be applied to a very wide variety of resources. In Part V, I consider the effects of this analysis on the classification of club, common, private, and public goods, as well as on our understanding of the evolution of property rights as a means of managing such resources. In an era increasingly defined by how well we manage our resources, these are matters of urgent practical, as well as theoretical, importance.

I THE LEGAL THEORY OF PROPERTY RIGHTS

Few legal scholars in the mid-nineteenth century would have questioned the view that property is a thing that is owned by an individual, and that property ownership meant the ownership of some object, typically land or some other form of tangible good.[1] This view of property has been described in many ways, often with reference to the famous description of property by eighteenth century legal scholar William Blackstone as "the sole and despotic dominion which one man claims and exercises over the external things of this world, in total exclusion of the rights of any other in the universe".[2] Modern scholarship refers to this conception of property as '*in rem*' or 'over a thing' since it's paradigm form is that of "a single human being owning . . . a single material thing";[3] as 'dominion' since it allows absolute control over the thing that is owned;[4] as 'property-as-commodity' since such ownership makes an object tradable;[5] as the 'exclusion view of ownership' since "owners have a right to exclude";[6] as the 'ownership model' of property since the emphasis is on the relationship between the owner and the object;[7] and as 'full-blooded ownership' since it confers upon the owner the right to make any use of the thing, to exclude absolutely anyone, and to transfer the thing howsoever they choose.[8]

This absolutist notion of property stems from the Middle Ages, when the most usual and simplest form of ownership in the English common law system had been that of fee simple absolute, whereby the king or queen granted the owner dominion over a piece of land. Such ownership effectively amounted to a delegated sovereignty, so the essence of fee simple absolute is that it was understood as the ability to prevent anybody interfering

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[1] Daniel B. Klein & John Robinson, *Property: A Bundle of Rights? Prologue to the Property Symposium* 8 ECON J. WATCH 193, 194 (2011).
[2] 2 WILLIAM BLACKSTONE, COMMENTARIES *2.
[3] Anthony M. Honoré,. *Ownership, in* OXFORD ESSAYS IN JURISPRUDENCE: A COLLABORATIVE WORK 107, 147 (A. G. Guest ed., 1961).
[4] Klein, *supra* note 1, at 194.
[5] GREGORY ALEXANDER, COMMODITY AND PROPRIETY: COMPETING VISIONS OF PROPERTY IN AMERICAN LEGAL THOUGHT, 1776-1970 (1997).
[6] Larissa Katz, *Exclusion and Exclusivity in Property Law*, 58 U. TORONTO L.J. 275, 281 (2008).
[7] JOSEPH W.SINGER, ENTITLEMENT: THE PARADOXES OF PROPERTY (2000).
[8] LAURA S. UNDERKUFFLER, THE IDEA OF PROPERTY: ITS MEANING AND POWER, 12 (2003).

with an owner's property in any way. As the dominant form of ownership, fee simple absolute reflected and reinforced the dominant idea of that time (and the view of most lay people ever since) that property was a relation between an owner and an object, with the owner's rights characterised by the fact that no-one except the owner had any rights to that land whatsoever. Importantly for the discussion that follows, this idea of ownership is dichotomous and absolute since, in this view, either a person owns a thing or they do not.

Towards the end of the nineteenth century, however, this idea of property as absolute dominion over land had become outdated, and the notion that property should instead be understood as a 'bundle of rights' became popular amongst legal scholars within the common law tradition. The 'bundle of rights' was used as a metaphor for the multiple rights specifying what the owner of property was allowed to do with it. This change in the understanding of the concept was provoked by the practical problem that the old absolute conception of property was not very useful for explaining how numerous different people could have rights to a single piece of land, since all or part of the property could be leased for a certain length of time, licences could grant access through certain parts of it, and many other varied permissions and easements could give other people some kind of right to it. This was troublesome for the absolutist view of property, but property conceived as a 'bundle of rights' allowed a much clearer explanation of how property rights could be unbundled and how different rights to the same thing could be held by different people.[9]

There were also other benefits of the view that property could be conceived as a non-absolute 'bundle of rights'. An early and influential contributor to the 'bundle of rights' conception of property was Wesley Newcomb Hohfeld who made much of the distinction between rights held by a person with respect to a thing (*in rem*) and rights held by a person with respect to another person (*in personam*).[10] With property no longer conceived as being the absolute ownership of a thing but as a 'bundle of rights' held by various different people, Hohfeld argued that it made sense to view property as rights held with respect to other people, and not as the relation between a person and an object. Again, such a conception helps to make sense of those legal realities that cannot be explained by a conception of property as the absolute ownership of a thing. For example, in the old view, the enforcement of the payment of a debt would be thought of as a right in relation to a thing, that is, as the right of the creditor to take possession of the money that is owed to them. In practice, however, if a debtor dies then the creditor's right to the debt also expires. This cannot be explained if the rights of the creditor are understood as a simple relation between the creditor and the money, but makes much more sense if the right to enforce payment of a debt is thought of as a right that a creditor may enforce as a duty upon another person.

[9] Klein, *supra* note 1.

[10] Wesley Newcomb Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 YALE L.J. 16 (1913); Wesley Newcomb Hohfeld, *Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 26 YALE L.J. 710 (1917).

By 1978 few legal scholars would have disagreed when Macpherson wrote that "the current common usage of the word 'property' is at variance with the meaning which property has in all legal systems and in all serious treatment of the subject . . . property is not things but *rights*".[11] Theorists began to turn their attention to the way that the varieties of rights could be bundled and unbundled.[12] Given the potential variety of property arrangements, it was widely thought that no definitive classification would be possible but that such classifications were nevertheless useful for describing different property systems.[13] Perhaps the best know example of such a taxonomical approach is Edella Schlager and Elinor Ostrom's categorisation of the five rights of ownership as access, withdrawal, management, exclusion and alienation.[14]

Towards the end of the twentieth century, however, some theorists began to express dissatisfaction with the 'bundle of rights' view on the grounds that characterising property as a mere 'bundle of rights' turned property into a set of possible social relations, and so failed to distinguish property rights from any other kinds of rights. Some scholars, such as James Penner,[15] Richard Pipes,[16] and Larissa Katz,[17] made various attempts to resurrect the notion of property rights in terms of *in rem* rights held over an object. However, these approaches continued to suffer from the same problems as before, as they failed to offer a satisfactory analysis of the complex reality of property rights and relations where many people can hold a variety of property rights in a single object, and some of those rights seem to relate to people rather than to the object.[18] Besides, as Robert Ellickson had previously noted, any position which took property to be an *in rem* right over an object could easily be translated into a set of *in personam* rights with regard to other people, up to and including the point where Blackstone's absolute despotic dominion over a thing could be translated into a complete 'bundle of rights' that, taken together, amounts to the right to prevent everyone else from doing anything whatsoever with that thing.[19]

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[11] CRAWFORD BROUGH MACPHERSON, *The Meaning of Property*, *in* PROPERTY: MAINSTREAM AND CRITICAL POSITIONS, 1, 2 (1978); *see* Underkuffler, *supra* note 8 (noting the consensus among legal scholars of this view).

[12] *See e.g.*, DANIEL H. COLE & ELINOR OSTOM *The Variety of Property Systems and Rights in Natural Resources*, *in* PROPERTY IN LAND AND OTHER RESOURCES (2011).

[13] *See, e.g.*, Honoré, *supra* note 3, at 165.

[14] Edella Schlager & Elinor Ostrom, *Property-Rights Regimes and Natural Resources: A Conceptual Analysis* 68 LAND ECONOMICS 249 (1992).

[15] JAMES E. PENNER, THE IDEA OF PROPERTY IN LAW (1997).

[16] RICHARD PIPES, PROPERTY AND FREEDOM (1999).

[17] Katz, *supra* note 6.

[18] Adam Mosoff, *The False Promise of the Right to Exclude*, 8 ECON J. WATCH 255, 257 (2011).

[19] Robert C. Ellickson, *Property in Land*, 102 YALE L.J. 1315, 1362-63 (1993); ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 115 (1991).

An alternative to the attempts at resuscitating the *in rem* view was the approach proposed by scholars such as Kevin Gray,[20] Carol Rose,[21] and Gregory Alexander,[22] who argued that the problems of these extreme positions could be remedied by amalgamating the two opposing views into a position whereby property is seen as a relation both between people and with respect to things. For example, in his 1991 paper 'Property in Thin Air', Kevin Gray argued that the 'bundle of rights' approach to property may best be understood as the right to control which people have access to a thing. Gray's paper is well known as an argument against the *in rem* view of property as a relation solely between an owner and an object, but Gray's argument also significantly departs from the 'bundle' view by arguing that all the various rights to property that scholars have categorised as being part of the 'bundle' could all be reduced to a single right: the right to control who has access to a thing. For example, the five categories of rights suggested by Schlager and Ostrom are access, withdrawal, management, exclusion, and alienation.[23] Following Gray's reasoning, each of these rights can be reduced to the right to control other people's access to a resource. The right to control access is, of course, already the first listed by Schlager and Ostrom, and this right to control access implies the next three rights in their list, since controlling who has access to the resource implies control of who can make withdrawals from it, who can manage it, and who is excluded from it. Their fifth right of ownership is that of alienation. In effect, alienation is the second order right to control access, since it is simply the right to assign, through gift or exchange, the right to control access to the property; in other words, the right to alienation is the right to sell or give away the right to control other people's access to a thing.

There are many other possibilities for categorising the rights that might be found in the 'bundle', but rarely mentioned in the legal scholarship is the right to extinguish a resource. The right to extinguish is important as it is so closely related to the idea that an absolute owner of a thing has the right to do whatever they wish with their possessions; it is also important in relating property rights, external costs, and resource overuse 'tragedies', which I discuss below. Yet the right to extinguish does not, at first, appear to be a right to control access to a thing, and does not immediately appear to have anything to do with other people at all. It appears, instead, simply to be a right with regard to a thing: the right to destroy that thing. However, the right to extinguish a resource can just as easily be characterised as the right to render that resource beyond use, since a person who exercises a right to destroy an object is exercising the right to prevent all other people from accessing that thing. In this way, in its effects, the right to extinguish is the right to prevent any other person from ever accessing that resource again.

The property debate within the legal scholarship has, then, reached broad consensus. Various formulations that in some way synthesise the *in rem* and *in personam* positions

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[20] Kevin Gray, *Property in Thin Air* 50 CAMBRIDGE L.J. 252 (1991).
[21] CAROL M. ROSE, PROPERTY AND PERSUASION: ESSAYS ON THE HISTORY, THEORY, AND RHETORIC OF OWNERSHIP (1994); Carol M. Rose, *Canons of Property Talk, or, Blackstone's Anxiety*, 108 YALE L.J. 601 (1998).
[22] Alexander, *supra* note 5.
[23] Schlager, *supra* note 14.

are now widely adopted by legal scholars. Indeed, as Gregory Alexander demonstrates in his 1997 analysis of the property debates, very few theorists in the history of the property debates have ever actually held solely *in personam* or *in rem* views, as most have in fact found it necessary to include both relations between people and relations between owners and objects in their accounts of property rights.[24] The result is the now widely held view amongst legal scholars that property rights relate both to people and to objects. That this approach is the orthodoxy is perhaps best illustrated by the fact that the American Law Institute now defines property as "legal relations between persons with respect to . . . things".[25]

Despite this convergence among legal scholars, there is still nothing approaching agreement on the meaning of the term 'property rights' among economists or across other disciplines.[26] Intriguingly, however, and quite independently of the theoretical legal debates, practitioners in various different fields have recently begun to note that the absolute 'either-you-own-it-or-you-don't' view of property may have become outdated. For example, development practitioners at the United Nations Human Settlements Programme have noted that the dichotomy between informal and formal property rights is no longer useful and that it would be better to conceive of ownership as a continuum in which people have varying degrees of control over a dwelling or a piece of land.[27] Similarly, intellectual property scholars Amy Kapczynski and Talha Syed recently argued that the ability of a patent owner to control people's access is better theorised as a continuum rather than as a dichotomy.[28] In both cases, the authors are conscious that this is a move away from the dichotomised models typically used in their respective fields and emphasise the importance of basing theory upon actual practice, although neither article refers to the legal scholarship discussed above.[29]

Given the widespread consensus reached in the legal discussions, it is perhaps surprising that practitioners have until now shared the layperson's conception of property rights as the absolute ownership of a thing. Yet even scholars who are aware of the debates within legal theory find themselves implicitly making assumptions based upon an absolute notion of property. One reason for this may be that economic and political theorists

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[24] Alexander, *supra* note 5.
[25] *Quoted in* Underkuffler, *supra* note 8, at12.
[26] Daniel H. Cole & Peter Z. Grossman, *The Meaning of Property Rights: Law Versus Economics?* 78 LAND ECON. 317 (2002).
[27] Remy Sietchiping, Dyfed Aubrey, Nefise Bazoglu, Clarissa Agustinus & Gora Mboup, *Monitoring Tenure Security Within the Continuum of Land Rights: Methods and Practices*, ANN. WORLD BANK CONF. ON LAND & POVERTY (2012), http://landandpoverty.com/agenda/pdfs/paper/sietchiping_full_paper.pdf [http://perma.cc/8N42-QKZK].
[28] Amy Kapczynski & Talyha Syed, *The Continuum of Excludability and the Limits of Patents*. 122 YALE L.J. 1900 (2013).
[29] *Id*. at 1915, 1958, 1962-63; Sietchiping *supra* note 27, at 3.

typically pay little attention to the effects of law on their respective subject matters,[30] and even within the law-and-economics literature the analysis of property law has been relatively neglected.[31] John Meyer suggests that a further reason for this gap may be that "even critics whose subject is the inconsistency of absolutist property with practice appear to have difficulty conceptualizing an alternative".[32] Reviewing historical cases and finding that in the last few hundred years of human history there are no instances of absolute property rights actually being practiced, Meyer notes that the attempts by legal theorist Thomas Grey and environmental philosopher Gary Varner to articulate a new conception of property are hampered by their historically inaccurate assumption that property was once held absolutely.[33] Other theorists, such as Harold Demsetz,[34] Douglass North and Robert Thomas,[35] James Krier,[36] and Francis Fukuyama[37] make a similar assumption but reversed. Often assuming what Thráinn Eggertsson calls the "the naïve theory of property rights" [38] whereby such changes in rights also appear to occur in the absence of coercion, such theories depict the evolution of property rights, and even human society as a whole, as a trend towards the inevitable establishment of absolutely private individual property rights in an ever greater number of things.

II OVERUSE TRAGEDIES

This assumption that property rights are absolute manifests itself in numerous debates across many areas of study within economics and politics, and is perhaps particularly evident whenever the word 'private' is used in opposition to terms like 'common', 'public', 'social' or 'state'. Used unquestioningly, such oppositions tend to result in theories that perpetuate the unrealistic conception of property as absolute and prevent a more accurate understanding of actual property practices.

An infamous example is the so-called 'tragedy of the commons' thesis. Advanced as a general argument by Garrett Hardin in 1968, the 'tragedy' thesis places private ownership in sharp distinction with common ownership, asserting that common ownership results in

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[30] Hanoch Dagan & Michael A. Heller, *The Liberal Commons*, 110 YALE L.J. 549, 555 (2001).
[31] Dean Lueck & Thomas J. Miceli, *Property Rights, and Property Law*, *in* HANDBOOK OF LAW AND ECONOMICS 183, 249 (A. Mitchell Polinsky & Steven Shavell eds., 2007); Thomas W. Merrill & Henry E. Smith, *What Happened to Property in Law and Economics?* 111 YALE L.J. 357 (2001).
[32] John M. Meyer, *The Concept of Private Property and the Limits of the Environmental Imagination*, 37 POLITICAL THEORY 99, 112 (2009).
[33] *Id*. at 116.
[34] Harold Demsetz, *Toward a Theory of Property Rights*, 1 J.L. & ECON. 341 (1967).
[35] Douglass C. North & Robert Thomas, *The First Economic Revolution*, 30 ECON. HIST. REV. NEW SERIES, 229, (1977).
[36] James E. Krier, *Evolutionary Theory and the Origin of Property Rights*, 95 CORNELL L. REV. 139, 157-59 (2009).
[37] FRANCIS FUKUYAMA, THE ORIGINS OF POLITICAL ORDER: FROM PRE-HUMAN TIMES TO THE FRENCH REVOLUTION, 15-25 (2011).
[38] THRÁINN EGGERTSSON, ECONOMIC BEHAVIOR AND INSTITUTIONS, 254 (1990).

the overuse of resources and concluding that the only two ways to prevent overuse are either state intervention or private property rights.[39] Despite the article's popularity, it contained numerous terminological confusions and an inability to account for the many successful commons found throughout the world; George Appell concisely summarises the many criticisms of Hardin's article by describing the 'tragedy' thesis as "conceptually flawed and empirically wrong".[40] Underlying these criticisms is the fact that Hardin failed to realise that commons are, both in theory and in practice, a form of property, and as such are governed by a system of property rights. For my purposes, the key point is that the 'tragedy' thesis rests upon assumptions of a private-common dichotomy (that Hardin misclassifies as being equivalent to a private-unowned dichotomy) that has no basis in either practice or theory. In the case of actual historical pastoral commons, for example, it has long been widely acknowledged that commons systems are in fact a kind of private property rights where each commoner has a specified right to use the commons in certain prescribed ways.[41]

Even theoretically the dichotomisation of private and common ownership found in the 'tragedy' thesis is muddled, as it is hard to see where a line between private property and common property can usefully be drawn. To take a simplified agricultural example, an individually held plot of land may be thought of as private property, or it may be thought of as a tiny commons. When two people co-own a plot of land, then this can be thought of as shared private property or, equivalently, as a slightly larger commons than an individual plot. As the commons grow larger to accommodate ever larger numbers of co-owners, each size of common may be placed along a continuum in which more and more individual property rights holders share various individual usage rights with regard to an ever larger plot of land.[42] In this conception of how a commons can be defined, a commoner's property right may consist of having a limited right to use a resource and a limited right to control other people's use. Such an understanding is, of course, predicated on an understanding that property rights are not absolute.

For resource overuse problems, adopting an absolutist property concept seems perhaps inevitably to lead to the oversimplified dichotomised private-or-state solution that Hardin advocates. But when property is seen as non-absolute it allows theorists to ask more nuanced questions about how property rights may be defined to prevent certain resources from being overused. Indeed, by adopting a non-absolute view of property, tragedies of

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[39] Garrett Harding, *The Tragedy of the Commons*, 162, SCI. 1243 (1968).

[40] George N. Appell, *Hardin's Myth of the Commons*, 5 (Soc. Transformation and Adaptation Research Inst., Working Paper No. 8, 1993), http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/4532/HARDIN.pdf [http://perma.cc/U7YW-6PXV].

[41] CARL J. DAHLMAN, THE OPEN FIELD SYSTEM AND BEYOND: A PROPERTY RIGHTS ANALYSIS OF AN ECONOMIC INSTITUTION, 23 (1980); WILLIAM GEORGE HOSKINS & L. DUDLEY STAMP, THE COMMON LANDS OF ENGLAND AND WALES, 4 (1963).

[42] Daniel W. Bromley & Michael M. Cernea, *The Management of Common Property Natural Resources* 14 (World Bank, Discussion Paper Vol. 57, 1989); Barry C. Field, *The Evolution of Property Rights*, 42 KYKLOS 319, 337 (1989).

resource overuse can be defined as a special form of negative external cost. Negative external costs occur when one person uses their property in such a way that it imposes a cost on another person without that person's prior consent, for example when a person produces air pollution that dirties their neighbour's laundry.[43] In the 'tragedy' debates, overuse arises because the unregulated use of a resource increases private gains for those who appropriate from that resource, and these private gains represent a cost to the other users of that resource.[44] The key point is that resource overuse problems represent a particular type of negative external cost: what turns a property system into a tragedy is that external costs are imposed by some resource users on other users of that resource. When the resource is extinguished, the appropriators have made gains, and the cost of the loss of that resource is imposed upon all present and future users to whom access is now denied.

Tragedies of resource overuse, then, are just one particular kind of external costs problem, whereby one person's control of a resource is such that they are able to extinguish it and thereby deprive all current and future users of the resource of access to it. Defined in this way, 'tragedies' are caused not by too few rights in property, but by some individuals having too extensive a right to control access to a resource, to the extent that they are able to extinguish it. Again, if the resolution to resource overuse 'tragedies', and perhaps to the problem of external costs more generally, is to redefine the property rights system that is put in place, then avoiding the tragedies of overuse will involve redefining a person's right to that property. As long as property is viewed absolutely, this solution does not present itself to theorists.

III EXTERNAL COSTS

Indeed, discussions surrounding external costs more generally have remained implicitly committed to the private-unowned, private-public, private-social, and private-state dichotomies that cause such confusion in the private-commons debate. It is, in fact, these very dichotomies that originally motivated Ronald Coases's 1960 paper 'On the problem of social cost'.[45] Until Coase's paper the prevailing model, due to Arthur Pigou, was that external costs occur when "there is a divergence between private and social costs".[46] For Pigou, this divergence needed to be corrected by state intervention in the form of taxation, regulation, or subsidy. This intervention would make the creator of the external costs, a polluter for example, pay for the damage that their pollution causes, thereby internalising the external cost. In response to Pigou, Coase noted that if both parties held clearly

[43] Less frequently discussed are positive external costs, for example when one person's bees pollinate their neighbours fruit trees; *see* Steven N. S. Cheung, *The Fable of the Bees: An Economic Investigation*, 16 J.L. & ECON. 11 (1973).
[44] *See* Appel *supra* note 40; Elinor Ostrom, Marco A. Janssen & John M. Anderies, *Going Beyond Panaceas*, 104 PROC. NAT'L ACAD. SCI. 15176 (2007); Colin W. Clark, *The Economics of Overexploitation*, 181 SCI. 630 (1973); Cole *supra* note 12.
[45] Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).
[46] Carl J. Dahlman, *The Problem of Externality*, 22 J.L. & ECON. 141, 141 (1979).

defined property rights and there were no transaction costs involved,[47] then both parties could reach an agreement without the need for outside intervention. In the case of the air polluter who dirties their neighbour's sheets, the polluter may choose to pay for the extra washing powder required to wash the sheets, or the neighbour may choose to pay the polluter to stop production. In such circumstances, the contract agreed by the parties would match whatever was most beneficial to them collectively, since each party would not be willing to pay more than they would gain from the exchange. As a result, the private costs would equal the social costs, since the costs for each of the parties would be the best outcome for both parties combined, so within that two person system the outcome would be socially optimal.[48] Coase emphasises (though this emphasis is not always noted by his followers) that in reality there are costs to transactions, as it costs time and money to make contracts in this way. So, for example, if there are a large number of people affected by air pollution then it may be almost impossible for them to form a coherent consortium to contract with the polluter, and the costs for each of those people to organise the group may be much more than each individual would have to spend on more washing powder. In such a high transaction cost scenario, even if the additional costs imposed by the pollution are much higher than the benefits gained by the polluter, the pollution would continue and the end result would not be socially optimal. So Coase suggests that, in the presence of high transaction costs, government intervention might be more appropriate than contractual agreements. This view is widely endorsed even by theorists such as Robert Nozick and Milton Friedman who are not generally known for advocating governmental intervention.[49] Similarly, George Stigler writes: "The difference between private and social costs or returns have provided a fertile ground for public control of economic activity. In fact one can attribute most limitations on private ownership or control of property to this source."[50]

But what is missed by this way of thinking is that at every stage of the Coasean analysis of external cost, there is the implicit assumption that property rights are absolute and dichotomised and that the solutions to problems of externals costs must be similarly dichotomous. The dichotomy is implicit in the premisses that assume property rights to be held absolutely by the parties, and is implicit in the assumption that markets consist entirely of private exchanges with no external limitations or regulation. It is, then, no wonder that these assumptions of dichotomy are preserved in the conclusion that when the problem of external costs is conceived as a divergence between private and social

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[47] Later, Coase agreed with an argument by Cheung that clearly defined property rights are implied by zero transaction costs; *see* RONALD H. COASE, THE FIRM, THE MARKET AND THE LAW 14-15 (1988).

[48] Lueck, *supra* note 31, at 229-31.

[49] MILTON FRIEDMAN & ROSE D. FRIEDMAN, FREE TO CHOOSE: A PERSONAL STATEMENT *(*1980); ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA (1974); for a review of similar statements, see Lawrence Wai-Chung Lai, *Libertarians on the Road to Town Planning: A Note on the Views of Robert Mundell, Karl Popper, Friedrich Hayek, Robert Nozick, Milton Friedman and Ronald Coase Towards Pollution* 73 TOWN PLANNING REV. 289 (2002).

[50] GEORGE STIGLER, THE THEORY OF PRICE, 120-21 (1987).

costs, it appears as a problem which may only be resolved by private market transactions or by state intervention that places 'limitations on private ownership'. Just as the 'tragedy' debates so often offer only a choice between privatisation and the state, so the wider debate around external costs present private transactions and state 'limitations' as the only possible resolutions to the problem of external costs.

What makes this a little surprising is that Coase himself seemed to glimpse an alternative possibility in the very paper that launched the property rights approach to external costs in the first place. In concluding that paper, he wrote:

> the failure to develop a theory adequate to handle the problem of harmful effects stems from a faulty concept of a factor of production. This is usually thought of as a physical entity which the business-man acquires and uses (an acre of land, a ton of fertiliser) instead of as a right to perform certain (physical) actions. We may speak of a person owning land and using it as a factor of production but what the land-owner in fact possesses is the right to carry out a circumscribed list of actions . . . . The cost of exercising a right (of using a factor of production) is always the loss which is suffered elsewhere . . . . In devising and choosing between social arrangements we should have regard for the total effect. This, above all, is the change in approach which I am advocating.[51]

Given that Coase's own proposal more than half a century ago appears to suggest that solving external costs involves recognising that property rights are a social arrangement permitting the rights holder to perform certain acts, it is surprising that the subsequent literature remains dominated by the idea that the default position for property rights still consists of property as the absolute ownership of a thing. Until today, discussions of external costs almost invariably focus upon whether some given external cost requires either state regulation or increased privatisation for their internalisation.[52] This inability to think beyond an oversimplified absolutist conception of property rights has led to an external cost debate that hangs on the horns of a non-existent dilemma.

One of the main problems, then, with the current approaches to resource overuse 'tragedies' and to external costs more generally is that they are premissed on the oversimplified assumption of property rights as absolute, with the result that this assumption is simply reproduced in the argument's conclusion. The unspoken assumption is that property is by default the absolute individual private ownership of an object, but this assumption is at odds with legal theory as well as empirical research. So the result of this assumption is the mistaken conclusion that the only alternative to absolute individual private ownership is the delimitation of rights by the state. Both premiss and conclusion are excessive simplifications that have led to a distortion of the problem. Property rights

[51] Coase, *supra* note 45, at 43-44.

[52] For a review of that literature, see Steven G. Medema, *The Coase Theorem: Lessons for the Study of the History of Economic Thought* 33 J. HIST. ECON. THOUGHT 1-18 (2011).

themselves are not absolute, and property is not a dichotomous concept. If property is not absolute, then these private-state and private-common dichotomies collapse, and the range of potential solutions available to theorists examining 'tragedies' and external cost increases.

A further realisation is that although absolutely private property rights can easily be assumed to be somehow prior to both markets and regulation, a more graded notion of property inherently invites the question: what defines the limits on property rights in the first place? Property rights do not exist fully formed only later to be limited by outside intervention; on the contrary, property rights are already bounded and delimited when they are created, and are defined, maintained, and redefined within the context of the wider social arrangements which we develop to manage resources. To automatically assume that the person who owns a factory has the right to pollute fails to take into consideration that their neighbour may have a right to clean laundry. In a similar way, to assume that common property is opposed to private ownership fails to take into account that what an individual may do with a thing is always already delimited by the rights of other people, just as they are in a more traditional commons. Indeed, the empirical evidence seems to suggest that whilst the common ownership of resources is many and varied,[53] extreme forms of absolute private property are never found in reality.[54] It has long been recognised that commons are a form of private property, but it may be time to acknowledge that the converse is also true: that all private property is, in practice, a kind of common property. Importantly, as I discuss below, this allows the tools of analysis used by commons scholars to be much more widely applied.

Abandoning an absolutist view of property also implies that markets can no longer be viewed as independent to the delineation of property rights. On the contrary, it is only once a particular property right has been recognised as tradable that it can be taken to market and exchanged; property rights are, then, inevitably prior to the market. On a non-absolute view of property, what is traded is not the thing itself but certain rights to control what may be done with that thing and by whom. Again, in the example of air pollution, whether a factory owner can continue to use their factory to pollute depends upon the degree of control that wider social arrangements have granted them. These arrangements may include contracts, norms of acceptable behaviour between neighbours, and regulation by legislative intervention. But no resource allocation of any kind, let alone one that is socially optimal, can be determined by the market independently of these other arrangements. The way that property rights are defined determines just which property rights are tradable and how they may be traded, so without the prior definition of property rights it would be impossible for a market in those rights even to exist.[55]

IV COMMON POOL RESOURCES

[53] *See e.g.*, ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990); Cole *supra* note 12.
[54] Meyer, *supra* note 32, at 112-16.
[55] *See* Paddy Ireland, *Property, Private Government and the Myth of Deregulation*, *in* COMMERCIAL LAW AND COMMERCIAL PRACTICE 85-113 (Sarah Worthington ed., 2003).

Commons scholars studying institutions governing common pool resources have long argued that the study of resource depletion has been beset by the persistent problem of using the outdated absolutist model of property rights. Again, they argue that the analysis of political economic issues should be based upon actual practices. As recently as 2011, Daniel Cole and Elinor Ostrom wrote:

> The wealth of empirical information . . . belies naïve and simplistic theories of property rights that reduce all resource conservation problems to either too little private-individual ownership or too little public ownership . . . [S]uch naïve theories, which are usually premised on comparisons of flawed existing institutions with perfect but purely theoretical alternatives . . . continue to dominate the literature.[56]

I here develop the analysis presented by commons scholars with emphasis on two important points. The first is that the approach of commons scholars focusses on the analysis of the systems and arrangements that govern resources, and as a result the role of property rights as an institution in their own right is relatively neglected.[57] Secondly, and more critically, despite broadly embracing the legal conception of property rights outlined above, commons scholars have still tended to dichotomise private property and common property arrangements. This is partly due to the importance of their work in opposing policies of 'privatisation' which transfer property rights away from traditional users, but as a result commons scholars have often, perhaps unwittingly, adopted the dichotomising terms of the 'tragedy'.[58] It may also partly result from commons scholars focussing on industrialising countries where many such transitions are taking place, as well as from the fact that their focus is upon fairly simple institutional arrangements managing relatively small resources.[59] If, however, all private property is really a form of common property, then the insights from the work of commons scholars may be usefully extended to many more resources than the fisheries, forests, grazing lands, and water sources that have dominated their analysis until now.

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[56] Cole, *supra* note 12, at 30.
[57] *Id.*
[58] *See e.g.*, Cole *supra* note 12; Ostrom, Elinor, *How Types of Goods and Property Rights Jointly Affect Collective Action* 15 J. THEORETICAL POLITICS 239 (2003); Margaret A. McKean, *Common Property: What is it, What is it Good For, and What Makes it Work?* in PEOPLE AND FORESTS: COMMUNITIES, INSTITUTIONS, AND GOVERNANCE 27 (Margaret A. McKean, Clark Gibson & Elinor Ostrom eds., 2000).
[59] *See* Arun Agrawal, *Sustainable Governance of Common-Pool Resources: Context, Methods, and Politics* 32 ANNUAL REV. ANTHROPOLOGY, 243 (2003); Jean-David Gerber, Peter Knoepfel, Stéphane Nahrath & Frédéric Varone *Institutional Resource Regimes: Towards Sustainability Through the Combination of Property-Rights Theory and Policy Analysis 68* J. ECOLOGICAL ECON. 798, 800 (2009).

To this end, a useful distinction can be made between resources that are stock-flow resources and those that are fund-service resources.[60] Stock-flow resources are physically transformed by their use, for example when a tree is transformed into the frame of a house, or into ash, heat, and smoke by burning it. Because they are physically transformed by their use, stock-flow resources are used up in the act of production; that is, they are subtractable and depletable. The rate at which stock-flow resources are used is not determined by their physical characteristics; a forest can be cut down very quickly or harvested at a very slow rate. Fund-services, on the other hand, are a specific configuration of stock-flow resources; a car, for instance, is a specific configuration of glass, metal, plastic, and rubber. Though they may be worn out a little, fund-services are not physically transformed by their use, and they can only be used at a given rate; a car, for example, cannot carry more people than it can physically contain. A fund-service resource can be converted into a stock-flow resource if it is used not for the services provided by its configuration but by transforming the physical materials that the resource provides, for example when the material from a car is reused as a stock-flow resource in a scrap yard.[61]

Stock-flow resources are the focus of analysis for commons scholars. They follow conventional economics by dividing between the stock and the flow of a resource, with the stock referring to the quantity of that resource, and the flow referring to the rate at which units are extracted.[62] Like capital, a stock can produce a flow of income; but if the flow is at too high a rate, then the stock will become depleted.[63] Whilst commons scholars, led by Elinor Ostrom, have focussed on the institutions of governance, my focus here is on the institution of property rights themselves, examining what kinds of property rights can be instituted over resources, and what relationship this may have with resource use and overuse.

V PUBLIC GOODS

The terminology used by commons scholars builds on the theory of public goods developed by Paul Samuelson.[64] One immediate definitional peculiarity is that the words 'good' and 'resource' are often used interchangeably. In economic theory, the difference is that a resource is something used to produce a good, and a good is a material that

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[60] *See* HERMAN E. DALY & JOSHUA FARLEY, ECOLOGICAL ECONOMICS: PRINCIPLES AND APPLICATIONS 71 (2010); NICHOLAS GEORGESCU-ROEGEN, THE ENTROPY LAW AND THE ECONOMIC PROCESS (1971).

[61] Joshua Farley, *The Economics of Sustainability*, in SUSTAINABILITY: MULTI-DISCIPLINARY PERSPECTIVES 40, 46-47 (Heriberto Cabezas & Urmila Diwekar eds., 2012).

[62] Ostrom, *supra* note 53.

[63] *See e.g.*, CHARLES A. S. HALL & KENT A. KLITGAARD, ENERGY AND THE WEALTH OF NATIONS: UNDERSTANDING THE BIOPHYSICAL ECONOMY 106 (2012) (setting out the metaphor of stock as capital).

[64] Paul A. Samuelson, *The Pure Theory of Public Expenditure*, 36 REV. ECON. & STATISTICS 387 (1954).

satisfies human wants.[65] But the distinction between goods and resources is somewhat arbitrary since materials can be used both directly to satisfy human wants and also indirectly to produce other things that can be used to satisfy human wants; a piece of coal can, for example, be used to produce electricity for heating a home or be used as fuel to directly heat a home. Interestingly, biologists and ecologists also use the term 'resource', but for them a resource is something that satisfies the needs of a living organism.[66] To avoid confusion, then, I use the term 'resource' to mean something which is used directly or indirectly to satisfy the needs or wants of a living human organism, and where it would be more usual to write 'good' I add this in parentheses for clarity.

So, the theory of public resources (or public goods) developed by Paul Samuelson is based on the concepts of 'excludability' and 'rivalry'. An excludable resource is one where others can be excluded from using the resource; a non-excludable resource is one where they cannot. A rival resource is one where one person's use of that resource prevents simultaneous use by another. Rivalry is also referred to as subtractability, and is described in economic terms as a resource for which there is a marginal cost for providing it to each marginal user. Nonrival resources, then, are where marginal costs are zero. It is usual to represent these resource characteristics as dichotomies, resulting in four discrete categories: private resources are excludable and rival; public resources (public goods or pure public goods) are non-excludable and nonrival; common pool resources are non-excludable but rival; and club or toll resources (club or toll goods) are nonrival but excludable (and so named because only those who are members of the club, or those who pay a toll, have access them). These categories are often presented, including by commons scholars, in a two by two table like this:

TABLE 1: TYPE OF RESOURCE AS CATEGORISED BY BINARIES OF EXCLUDABILITY AND RIVALRY

	Excludable	Non-excludable
Rival	Private	Common pool
Nonrival	Club or toll	Public

Current legal scholarship, as discussed above, has widely rejected the idea that anyone has ever held the absolute right to exclude absolutely everyone from a resource, and has long recognised that the property right of excluding others is not a physical characteristic of a thing but rather a legal relation between persons with respect to things.[67] As a result, the ability to exclude is never absolute, and so excludability is more accurately understood as the unrealised extreme at one end of a continuum of excludability. The recognition of this has led to modern economic scholarship referring instead to the difficulty or cost of exclusion, though it is important to note that the difficulty or costs of excluding somebody from using a resource is not a matter of the physical characteristics

[65] Murray Milgate, *Goods and Commodities*, *in* THE NEW PALGRAVE DICTIONARY OF ECONOMICS 546, 546-48 (John Eatwell, Murray Milgate, and Peter Newman eds., 2008).
[66] R.E. RICKLEFS,. THE ECONOMY OF NATURE (6th ed. 2005).
[67] *See supra* notes 24–25 and accompanying text.

of that resource, but entirely to do with the definition of the property rules that govern that resource.[68] It is, for example, relatively easy and cheap to exclude somebody from using the light from a torch by keeping the torch in a padlocked cupboard, but only as long as there are rules that are enforced to make it easy and cheap to prevent people from using things that are kept locked in a cupboard. What makes it so much more difficult and expensive to stop someone using the light from the sun is not the physical characteristics of sunlight, but a legal and social context that makes it costly and difficult to keep other people locked in cupboards.

Excludability, then, is a matter of degree, so the distinction between private and common pool resources is not the sharp binary presented by Table 1. Commons scholar Margaret McKean argues that common property should share the same classification as business partnerships and joint-stock corporations.[69] If absolute private property has never existed, then all forms of private property may be considered by this analysis to be common property. In other words, excludability is a question of degree, with complete exclusion at one unrealised extreme. On this understanding, whether a resource is more privately owned or more commonly owned is nothing to do with the physical resource itself, but entirely to do with the property rights that have been instituted to control who has access to that resource. Put simply, the more that control of a rival resource is shared amongst a greater number of people, the more it is held in common. Modifying Table 1 to keep rivalry as a binary but considering excludability to be a continuum yields Table 2:

TABLE 2: TYPE OF RESOURCE AS CATEGORISED BY A CONTINUUM OF EXCLUDABILITY AND A BINARY OF RIVALRY

	Range of excludability
Rival	More private ranging to more common pool resources
Nonrival	More club or toll ranging to more public resources

Many modern economists also suggest that the dichotomy between rival and nonrival resources is outdated and that a graded approach to rivalry is more appropriate.[70] Their reasoning is that whilst some resources are absolutely rival, for example where a gallon of petrol cannot be used both for fuelling a car and for fuelling an aeroplane, many physical resources are nonrival up to a certain point, after which marginal costs increase. A usual example is the provision of public roads. Up to a certain capacity roads are nonrival since an additional car driving on that road does not increase the costs of that road (the costs of maintenance are usually ignored as negligible), but once a certain capacity is reached the road becomes congested, decreasing the ability of others to use it.

However, Joshua Farley argues that this line of reasoning is flawed, since it confuses nonrivalry for abundance.[71] The physical space occupied by a car on a road is rival, since

[68] Daly *supra* note 60, at 73; Farley *supra* note 61.
[69] McKean *supra* note 58.
[70] JOHN LEACH, A COURSE IN PUBLIC ECONOMICS 155-56 (2004).
[71] Farley *supra* note 61, at 49.

only one car can occupy a given space at a time. So as long as there is an abundance of additional spaces for additional cars, an empty road may appear to be a nonrival resource. But if more and more cars occupy more of the road space then the road space becomes scarce and rival, and the road is less and less able to satisfy the road users' desire to move quickly from one place to another. In other words, the resource becomes depleted, and an additional carriageway or an additional road may be constructed to increase the provision of the physical road space and so reduce the rivalry between road users.

Following this reasoning, the difference between nonrival and rival resources is simply that nonrival resources are abundant. The list of nonrival resources typically include those benefits provided by lighthouses, the ozone layer, the provision of law and order, scenic beauty, and street lamps. The benefits from these resources are a result of their physical properties but these benefits are not depleted by their use by marginal users; that is, they are fund-services. To what extent, then, can these nonrival resources become rival through their scarcity? If the materials required to run lighthouses and street lamps became scarce and decisions needed to be made about which ones to keep lit, which direction to point them in, or how brightly to shine them, then users would find that their desire to use this light rivalled with the desire of those who wanted to use that light in different ways. If ozone depletion meant that some parts of the world become dangerous to live in due the frequencies of light that reach them, then the protection afforded by the ozone layer would become scarce and rival. If the provision of courts, of legal aid, or of the police is reduced, then some members of the population may no longer be as protected, or some crimes may no longer be detected or deterred in the same way as others, so the provision of law and order becomes scarce and rival. If sites of scenic beauty become scarce then not everyone who wishes to appreciate them would be able to do so simultaneously, for there is a limit to the number of people who can be within view of any given piece of landscape. In each of these cases, if a previously nonrival resource is no longer abundant, then one person's use of that resource prevents simultaneous use by another, and so that resource becomes rival.

The distinction made above between stock-flow and fund-service resources is again important here. In examples involving light, for example, fund-services like lamps, ozone, and views are not actually the source of the flow of light, but are merely the means by which the physical qualities of that flow of light are altered, whether in the places that it shines, or in the frequencies it shines at, or in its conveyance of scenic beauty to the eye of a beholder. Similarly, the fund-service of an organised police force does not itself detect or deter crime, but merely directs the flow of human energy and other resources in the form of police officers carrying out that work. On this understanding, then, nonrival resources are those where the flow of resources is abundant but fund-services may be required to make that flow useable. Those fund-services may be costly to provide, but once they exist they can provide an abundant flow of that resource. Since it is hard to get people to pay for abundant resources, the provision of fund-services to provide those resources may be undersupplied by the market, and may instead be provided by public bodies as public resources from which few people are excluded, or as club or toll resources where access is restricted in order to create an artificial scarcity where their flow may be sold. These, too, form a continuum depending on social and political

arrangements; a site of scenic beauty may be made accessible to all citizens and visitors to a country, or access to it could also be restricted to a smaller group of club members willing and able to pay a toll for entry.

So, resources can be categorised as either stock-flow or fund-service resources. All stock-flow resources are depletable and therefore rival; also rival are those fund-service resources that direct non-abundant flows. Rival resources may be categorised along a range of excludability, from more private to more common. All nonrival resources are fund-services that direct abundant flows, and may be further categorised along a range of excludability, from club or toll to public resources. The problem associated with rival resources is that they are not abundant, and so they may be overused and become depleted. The opposite problem of underprovision is associated with nonrival resources, since once fund-services are supplied, the flow from them is abundant and hard to make profitable. As a result, two distinct types of property rights institutions have developed, one to encourage the provision of nonrival resources, the other to reduce the risk that rival resources become depleted. This distinction helps explain a pressing problem: since fossil fuels are rival and depletable, property rights regimes have evolved to limit their supply, whereas the nonrival abundance of resources such as sunlight and wind suggests that energy from those sources will be underprovided unless supplied as a public resource by a public body.

CONCLUSION

In this paper, I have argued for the rejection of an absolutist conception of property and for the adoption of a conception of property that is closer to current legal theory and actual property practices. Such a shift allows theories of external costs, common pools, and public goods to be brought together to better understand the evolution of property rights in all manner of resources. The range of theories discussed in this paper shows how important the concept of property rights is for economic, social, and political thought, and suggests how the analysis of policies governing the provision of emerging energy resources, in particular, may be affected.