THE LOCALIST CONSTRAINTS OF ENERGY LOCALISM

RICK SU*

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I. INTRODUCTION

What regulations should be imposed on unconventional gas extraction techniques like hydraulic fracturing and horizontal drilling? What incentives, if any, should be given to encourage the use of renewable energy sources such as wind and solar? Should concerns about climate change guide policies regarding the nation's energy future? And what kind of steps should be taken to address the economic impacts and job losses that those policies might bring?

Energy law has long been concerned with these questions. But, a shift is now underway with respect to who should be involved in making these decisions. For more than a century, it was imagined that energy law could only be established at the highest levels of government—if not by the federal government, then certainly by the states. In recent years, however, a growing number of energy scholars are turning their attention to the local level. Some believe that local residents should be given more say over what energy policies are adopted.[1] Others suggest that local communities be given an explicit veto over energy proposals altogether.[2] All the while, many question the wisdom of centralization in energy law,

* Professor, University of North Carolina School of Law.

1. *See* Sean F. Nolon, *Negotiating the Wind: A Framework to Engage Citizens in Siting Wind Turbines*, 12 CARDOZO J. CONFLICT RESOL. 327, 328, 330–31 (2011); Hannah J. Wiseman, *Disaggregating Preemption in Energy Law*, 40 HARV. ENVTL. L. REV. 293, 293, 295, 302 (2016).

2. *See* David B. Spence, *The Political Economy of Local Vetoes*, 93 TEX. L. REV. 351, 412 (2014).

especially its traditional focus on administrative policymaking.[3] Increasingly, energy scholars are embracing local governments as a means of expanding participatory democracy.[4]

This Essay embraces the localist turn in energy law—a turn that I refer to as "energy localism." It questions, however, whether the democratic aims of energy localism can be achieved through the types of local governments that are often at the front lines of energy disputes. My concerns are not those ordinarily associated with decentralization more generally: that they lead to legal patchworks, empower amateur lawmakers, or privilege parochial interests. In most cases, I do not believe these concerns outweigh the instrumental and expressive values of local participation, or that these concerns cannot otherwise be managed through other means. Rather, my worry is with respect to the democratic capacity of local governments themselves, especially the rural counties and towns where most energy developments are located.[5] Are they legally structured to provide meaningful representation for their residents? Do they have the legal authority to channel their residents' interests into tangible policies? And can they do so given the political influence and deep pockets of the energy industry?

I raise these concerns not because I believe that energy localism is not worthwhile. Nor do I believe that local governments are not the appropriate forum to which energy policymaking might be decentralized. Rather, my goal here is to point out ways in which localism in general, and rural localism in particular, might be enhanced in order to effectuate the vision of energy localism set out by its supporters. In other words, proponents of energy localism should be just as concerned about reforming localism as they are about reforming energy law. This essay makes the case for that approach. In addition, it offers some thoughts on what those reforms might be.

This Essay proceeds as follows. Part I describes the rise of energy localism and how it challenges the centralization that has long dominated the development of energy law. Part II examines the legal structure and democratic organization of rural local governments and how that might affect their role in energy policymaking. Taken together, Part III considers how the prospects

3. *See* Ann M. Eisenberg, *Alienation and Reconciliation in Social-Ecological Systems*, 47 ENVTL. L. 127, 171 (2017).

4. *See, e.g.*, Kacper Szulecki, *Conceptualizing Energy Democracy*, 27 ENVTL. POL. 31, 23–24 (2018).

5. *See generally*, Rick Su, *Democracy in Rural America*, 98 N.C. L. REV. 837, 839 (2020).

for energy localism might be enhanced through structural reforms to rural local governments. All of this is followed by a brief conclusion.

II. THE TURN TOWARD ENERGY LOCALISM

Energy law is at a crossroads. The traditional view of energy law is as a specialized field based on centralized policymakers, administrative rule-making, and an exclusive focus on the national interest. But in recent years, an increasing number of energy scholars are beginning to question this top-down perspective. This Part outlines these competing perspectives and maps the beginnings of the transition from the former to the latter. It begins with an explanation of why energy law has long been considered a case study in centralization. It then describes why some energy scholars are beginning to turn their attention to the local level and the proposals now giving rise to energy localism. At the heart of this shift, I argue, is not just a reconsideration of the level of government responsible over energy law, but more importantly a rethinking of the relative value of administrative rule-making versus democratic accountability.

A. Energy Centralization

The traditional view of energy law assumes a top-down perspective. And the reason for this is normally considered to be both descriptive and normative. Descriptively, energy law since its beginning in the late nineteenth century has been increasingly centralized at higher levels of government and increasingly through rules developed by specialized agencies. Normatively, it is imagined that this centralization is necessary to deal with the scope, complexity, and significance of energy policies.

Energy law emerged as a distinct field in the late nineteenth century when comprehensive regulations were adopted at the state and federal levels.[6] As the importance of energy became apparent during the industrial revolution, states across the country adopted laws governing the extraction of gas, coal, and oil, especially where those deposits were most prevalent.[7] Later, as it became clear that energy was central to economic development and national security, the federal government assumed control over energy production and markets in the early twentieth century—both in response to

6. Joseph P. Tomain, *The Dominant Model of United States Energy Policy Focus on Natural Resources Theory*, 61 U. COLO. L. REV. 355, 356–57 (1990).

7. *See, e.g.*, *id.* at 357.

surpluses during the Great Depression and shortages during the Second World War.[8] And as new energy sources emerged in the mid- to late-twentieth century, the path toward regulatory centralization continued. The Federal Power Commission (the precursor to the Federal Energy Regulatory Commission) was given responsibility over hydroelectric power in the 1920s.[9] The Atomic Energy Commission (the precursor to the Nuclear Regulatory Commission) was granted plenary authority over civilian nuclear power in the 1940s.[10] And with the recent rise in renewable energy, it is the state and federal governments that have been primarily responsible in guiding its growth through renewable energy targets, subsidies, and tax incentives.[11]

Of course, energy was not the only area of law where regulatory centralization occurred, especially during the rise of federal power in the twentieth century.[12] But given the nature of energy production and distribution, centralization in this area appears to be particularly apt. After all, energy projects often span multiple jurisdictions, be it electric transmission grids that serve a broad region in a particular state, or gas and oil pipelines that cross the entire country.[13] At the same time, energy itself was becoming an increasingly technical field. Technological innovations enhanced the scope and capabilities of energy producers. But it also made it harder to assess their efficacy or balance their economic benefits against societal costs. Only policymakers at the highest levels, it was imagined, had the necessary vantage to capture all the competing interests.[14] Only specialized agencies, it was believed, could muster the experts and know-how needed to understand how these technologies worked.[15]

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8. *See* RICHARD H. K. VIETOR, ENERGY POLICY IN AMERICA SINCE 1945: A STUDY OF BUSINESS-GOVERNMENT RELATIONS 15–16 (Louis Galambos & Robert Gallman eds. 1987).

9. JULIE A. COHN, THE GRID: BIOGRAPHY OF AN AMERICAN TECHNOLOGY 78 (2017).

10. STEPHANIE A. MALIN, THE PRICE OF NUCLEAR POWER: URANIUM COMMUNITIES AND ENVIRONMENTAL JUSTICE 133–34 (2015).

11. *See* KATRIN JORDAN-KORTE, GOVERNMENT PROMOTION OF RENEWABLE ENERGY TECHNOLOGIES: POLICY APPROACHES AND MARKET DEVELOPMENT IN GERMANY, THE UNITED STATES, AND JAPAN 82–85 (2011).

12. *See*, *e.g.*, *generally*, Hugh Rockoff, *By way of analogy: The expansion of the federal government in the 1930s, in THE DEFINING MOMENT: THE GREAT DEPRESSION AND THE AMERICAN ECONOMY IN THE TWENTIETH CENTURY* 125 (1998)

13. *See, e.g.*, Max Hensley, *Power to the People: Why We Need Full Federal Preemption of Electrical Transmission Regulation*, 46 U. MICH. J.L. REFORM 1361, 1366–67 (2013); Megan O'Rourke, *The Keystone XL Pipeline: Charting the Course to Energy Security or Environmental Jeopardy*, 24 VILL. ENVTL. L.J. 149, 250 (2013).

14. *Cf.* Brian Galle & Mark Seidenfeld, *Administrative Law's Federalism: Preemption, Delegation, and Agencies at the Edge of Federal Power*, 57 DUKE L.J. 1933, 2009 (2008).

15. *See* Frank N. Laird, *Technocracy revisited: knowledge, power and the crisis in energy decision making,* 4 Industrial Crisis Quarterly 49, 53 (1990).

But perhaps the main reason why energy law is traditionally viewed from a centralized perspective is because of the stakes involved. In other words, the consequence and impact of energy policy just seems too big, too significant, and too expansive to be left to local jurisdictions. Energy is central to our nation's economic development and global competitiveness—not only because energy fuels our economy, but also because energy is itself a major sector in the global marketplace.[16] Energy has long been associated with national security and foreign affairs, as reflected in the role of energy in shaping our military engagements and the use of energy sanctions to exert diplomatic pressure.[17] Indeed, one of the biggest arguments for expanding domestic energy production is the achievement of energy independence as a means of limiting our dependence on foreign sources and, as a result, the need for military engagements around the world.[18] And with the onset of climate change, there is only more reason to believe that our energy future depends on national, if not international, policies and accords.

Given all this, it is not surprising that energy law has traditionally been viewed from the top-down. It is not just that energy policies today are primarily established at the state and federal levels, and through the guidance and expertise of administrative agencies. It is also the commonly-held view that in the context of energy, the stakes are simply too important, the challenges too big, and the impact too expansive to be left to the meddling of local policymakers and the whims of ordinary citizens.[19] If anything, it is believed that reforms should be directed towards more centralization of energy policymaking, not less.

B. The Localized Impacts of Energy Law

But as much as the top-down perspective captures about the nature of energy in the United States, it also obscures an important

16. *See generally*, Martha Caldwell Harris, *The globalization of energy markets*, *in* Challenges of the Global Century 271 (2001).

17. *See generally*, ANDREW T. PRICE-SMITH, OIL, ILLIBERALISM, AND WAR: AN ANALYSIS OF ENERGY AND US FOREIGN POLICY 50–51, 75, 82, 86 (2015).

18. *See generally*, JAY HAKES, A DECLARATION OF ENERGY INDEPENDENCE: HOW FREEDOM FROM FOREIGN OIL CAN IMPROVE NATIONAL SECURITY, OUR ECONOMY, AND THE ENVIRONMENT 7, 101 (2008).

19. *See* Nolon, *supra* note 1, at 330 ("However, in the context of decision-making intended to fully incorporate a range of concerns, 'citizen involvement' refers to a more inclusive, transparent and responsive process. Many agencies resist more robust levels of citizen involvement at the policy development stage, preferring to rely on the minimal processes with which they are familiar. Resistance to this level of citizen involvement is endemic and springs from beliefs [and experiences] that engaging citizens takes too long, is too costly, and results in sub-optimal solutions.").

fact: the uneven and localized impact that energy production has on certain parts of the country. Energy operations are not evenly distributed across the nation, but tend to be concentrated in specific communities—primarily rural, often poor, and frequently those belonging to people of color.[20] It is these communities that disproportionately bear the cost of energy policies.[21] And this geographic split is also why energy politics is so fraught, especially when it intersects with partisan and regional identities.[22] In other words, the importance of energy may be national and global. Yet it is often at the local level where many of the impacts of energy policy are most acutely felt.

This uneven and localized impact of energy law and development is, of course, not new. The energy sector—from extraction, to production, to distribution—has long centered in certain communities, many of which are in rural areas. Coal and oil extracted from rural Appalachia drove the industrialization of America's major cities in the late nineteenth century.[23] And while the earliest power plants were located in or near the cities themselves, later advances in transmission technology led newer facilities to be sited in more remote areas.[24] Hydroelectric was one of the earliest clean energy sources to be developed. But by nature of its technology, it too was located in largely rural areas and often required damming that altered the rural landscape and the livelihood of surrounding communities.[25] Even thermonuclear power, which once promised "infinite energy" and could theoretically be located anywhere, still had a disproportionate impact on rural locales; that is, uranium is mined in rural

20. *See*, *e.g.*, Yelena Ogneva-Himmelberger & Liyao Huang, *Spatial Distribution of Unconventional Gas Wells and Human Populations in the Marcellus Shale in the United States: Vulnerability Analysis*, 60 APPLIED GEOGRAPHY 165, 168, 171, 173 (2015).

21. *See* Loka Ashwood, *Rural Conservatism or Anarchism? The Pro-State, Stateless, and Anti-State Positions*, 83 Rural Sociology 717, 735 (2018); Spence *supra* note 2, at 357–58, 367.

22. *See generally*, Hari M. Osofsky and Jacqueline Peel, *Energy Partisanship*, 65 EMORY L.J. 695 (2016).

23. *See*, *e.g.*, RONALD D. ELLER, MINERS, MILLHANDS, AND MOUNTAINEERS: INDUSTRIALIZATION OF THE APPALACHIAN SOUTH, 1880–1930, at 128 (1982).

24. *See* Hannah J. Wiseman, *Urban Energy*, 40 FORDHAM URB. L.J. 1793, 1794–95 (2013).

25. *See*, *e.g.*, CHRISTOPHER J. MANGANIELLO, SOUTHERN WATER, SOUTHERN POWER: HOW THE POLITICS OF CHEAP ENERGY AND WATER SCARCITY SHAPED A REGION 7–8 (2015).

communities,[26] the reactors located at the outskirts of the metropolitan regions, and the disposal of spent nuclear waste concentrated in remote locations.[27]

And despite the optimism that some have expressed about the next energy revolution,[28] geographic imbalances persist even as renewables have become more prevalent. Large-scale renewable energy projects still dominate, and rural areas continue to be where they are built. Some of this reflects the locations where renewable resources like wind and sunlight are plentiful, much like the siting of hydroelectric facilities in earlier eras.[29] Another reason is the economics of real estate, which makes urban and suburban locations costly and unprofitable.[30] And while the detrimental impacts of renewable energy are far less onerous than those associated with fossil fuels and nuclear energy, they are not entirely costless. Solar farms occupy land that might otherwise be dedicated to farming or grazing.[31] People complain wind turbines mar the natural environment,[32] and does not substitute for other rural industries like mining.[33] Technology is revolutionizing the future of energy production, but they continue to impose discrete and concentrated impacts at the local level.

For many communities then, the impact of energy policy is not only more significant and immediate than the effect on our nation as a whole. It is also in many cases tied directly to the fate of their communities. Some communities are economically dependent on existing energy operations, afraid that any changes in energy policy

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26. *See* MALIN, *supra* note 10.

27. *See* Richard S. Krannich et al., *Rural Community Residents' Views of Nuclear Waste Repository Siting in Nevada*, *in* PUBLIC REACTIONS TO NUCLEAR WASTE: CITIZENS' VIEWS OF REPOSITORY SITING 263, 263–64 (Riley E. Dunlap et al., eds. 1993).

28. *See generally*, Hannah J. Wiseman, *supra* note 24 (looking forward to the proliferation of proliferation of roof-top solar panels and small wind turbines that will generate power where they are needed).

29. *See* Samantha Gross, *Renewables, Land Use, and Local Opposition in the United States*, Brookings Institution, Jan. 2020, at 8–9, https://www.brookings.edu/wp-content/uploads/2020/01/FP_20200113_renewables_land_use_local_opposition_gross.pdf.

30. *See* Brittany Patterson, *Cities and Towns Choose Renewables to Save Money*, Scientific America, Mar. 26, 2015 (describing how solar farms are developed on cheap land and then transmitted to metropolitan regions where it is needed), https://www.scientificamerican.com/article/cities-and-towns-choose-renewables-to-save-money/.

31. *See* Scott Dance, *As massive solar farms blossom, officials face conflict between state energy policy and local preferences*, Baltimore Sun, Oct. 15, 2016, https://www.baltimoresun.com/maryland/bs-md-renewable-energy-conflict-20161015-story.html.

32. Adam Hochberg, Wind Farms Draw Mixed Response in Appalachia, NPR, Mar. 27, 2006, https://www.npr.org/templates/story/story.php?storyId=5300507.

33. *See* Doug Struck, *Power pivot: What happens in states where wind dethrones King Coal?*, C.S. Monitor, Aug. 21, 2020, https://www.csmonitor.com/Environment/2020/0821/Power-pivot-What-happens-in-states-where-wind-dethrones-King-Coal.

will erode job prospects and endanger their survival.[34] Others are forced to bear the health and environmental costs of these industries, worried about losing more of the natural beauty that has long defined their communities, or the lives of those who they hold most dear.[35] And in too many cases, these two communities are one and the same. The concentration of refineries along the Mississippi River in Louisiana generates jobs and tax revenues necessary for the survival of the communities around them.[36] Yet it also those refineries, and the effect of their operations on neighboring residents, that is the reason the area is widely known as "Cancer Alley."[37] These competing concerns are difficult to balance on their own. They are made even more difficult by divides within the communities themselves and the fact that the residents who depend on certain industries for their livelihood are not always the same ones that suffer those industries' most significant costs.[38] While some ask whether their communities can survive without oil, gas, or coal, others worry whether their communities can survive *with* them.[39]

Nor are these questions easier in the communities that have benefitted from new and expanding energy sectors. Take, for example, the rapid growth of unconventional gas drilling, which has made available deposits that were once deemed inaccessible.[40] Like the oil boom that came before, many communities have become boomtowns overnight, as gas companies descend to secure drilling rights and imported workers arrive to extract on their behalf.[41] But with the increase in population and tax revenue comes new challenges: increased traffic, overcrowded schools, shortage of housing, and increased cost of living, among others.[42] These challenges also create rifts in the community—between old-timers and newcomers, between those who profit and those who do not, between the interests of local governments and their residents. And

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34. *See* Will Wright, *Can Biden Keep Coal Country From Becoming a 'Ghost Town'?*, NY TIMES, Mar. 5, 2021.

35. *See generally*, ELIZA GRISWOLD, AMITY AND PROSPERITY: ONE FAMILY AND THE FRACTURING OF AMERICA 4–6 (2018).

36. STEVE LERNER, DIAMOND: A STRUGGLE FOR ENVIRONMENTAL JUSTICE IN LOUISIANA'S CHEMICAL CORRIDOR 168 (2006).

37. *See id*. at 43.

38. *See id*. at 61–62.

39. *See id*. at 45–46.

40. *See* J. David Hughes, *Reality check on the shale revolution*. 494 *Nature* 307, 307 (2013).

41. *See* Chip Brown, *North Dakota Went Boom*, N.Y. Times Magazine, Jan. 31, 2013, https://www.nytimes.com/2013/02/03/magazine/north-dakota-went-boom.html.

42. *See* Thomas Gunton, *Natural Resources and Regional Development: An Assessment of Dependency and Comparative Advantage Paradigms*, 79 ECON. GEO. 67, 70 (2003).

hanging over all of this is the uncertainty of the energy markets; the knowledge that the boom might end with the next economic downturn, and the decisions of foreign governments. For better or worse, energy ties local communities to the broader global economy. We are already beginning to see the consequences of this as COVID-19 has upended the economics of these energy sectors.[43]

All of this suggests that when it comes to energy law, many of the policy battles are structured as zero-sum games. It is easy to imagine win-win solutions abound, especially in the long term and with national interests in mind. Renewable energy, for example, is touted as a way to not only combat climate change but also for the new jobs that would be created.[44] But as J.B. Ruhl warned, it is also important to recognize that in the short-term and with an eye toward different segments of the population, there are significant trade-offs that must be accounted for.[45] Even if renewables will eventually benefit everyone, the transition from conventional energy sources will benefit some while imposing costs on others. And given how energy production is localized, these benefits and costs will be distributed unevenly between different parts of the United States.

This is probably why even if energy policies *should* be made from a national perspective, the actual politics is both geographically and ideologically split. Agricultural communities support biofuels. Coal and gas areas rally behind fossil fuels. While wind and solar facilities are welcomed in certain communities, they are perceived as threats in others.[46] All the while the urban-rural split that now dominates partisan politics becomes the lens through which energy policies are viewed.[47]

C. The Rise of Localism

Energy production and the policies that guide it impose uneven and localized impacts on communities across the country. It is this fact that has, in recent years, led to the rise of energy localism. Increasingly, scholars are beginning to grapple with the local

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43. *See* Tamir Kalifa & Clifford Krauss, *'This Feels Very Different',* NY TIMES, May 1, 2020 (describing the collapse of Texas Oil Boomtowns as a result of COVID-19), https://www.nytimes.com/2020/05/01/business/energy-environment/oil-industry-texas-coronavirus.html."

44. *See* J.B. Ruhl & James Salzman, *Why Environmental Zero-Sum Games are Real*, *in* BEYOND ZERO-SUM ENVIRONMENTALISM 1 (Sarah Krakoff, et al., eds. 2019).

45. *See id*. at 7–9.

46. *See* Kate K. Mulvaney et al., *A Tale of Three Counties: Understanding Wind Development in the Rural Midwestern United States*, 56 ENERGY POLICY 322, 327–28 (2013).

47. *See, e.g.*, Eisenberg, *supra* note 3, at 129.

impacts of energy policy. In turn, many are arguing that local communities should be given a more significant role over how energy policies are made. Some are arguing that incentives and compensation should be provided to communities most impacted by energy policies made at the state or federal levels.[48] Others are asserting that local residents should be given more say over the siting of energy facilities and their operations.[49] Indeed, an increasing number of scholars are even asserting that local governments be allowed to veto policy decisions made at higher levels.[50]

At the most basic level, energy localism appears to be an effort to account for the influence that local communities have long exerted on the energy sector. Since the early twentieth century, energy policy has largely been set at the state and federal level, and through administrative agencies not directly beholden to local constituents. But local opposition—largely through the exercise of land use powers through local governments—has long played a significant role in shaping energy development. The growth of nuclear power in United States was derailed in the 1970s by waves of local resistance, many of which deployed local zoning and environmental regulations to stall the development of facilities sanctioned by federal regulators.[51] Local communities used a similar set of legal restrictions to oppose hydraulic fracturing for natural gas four decades later, which prompted many states to pass legislation to preempt these restrictions on behalf of the gas industry.[52] And proposed developments of large-scale wind and solar farms are also now facing local resistance that have made the shift to renewable energy more difficult.[53]

At a deeper level, however, energy localism is an effort to rethink how energy policies are made. In contrast to the traditional view of localism in the energy context as a site for resistance founded

48. *See* Spence, *supra* note 2, at 393–94; *see also generally*, Vicki Been, *Compensated Siting Proposals: Is it Time to Pay Attention?,* 21 FORDHAM URB. L.J. 787 (1994).

49. *See*, *e.g.*, J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—with Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1397 (2011).

50. *See*, *e.g.*, Spence, *supra* note 2.

51. *See* FRANK R BAUMGARTNER & BRYAN D JONES, AGENDAS AND INSTABILITY IN AMERICAN POLITICS 59–82 (2010).

52. *See*, *e.g.*, Stephen Elkind, *Preemption and Home-Rule: The Power of Local Governments to Ban or Burden Hydraulic Fracturing*, 11 TEX. J. OIL GAS & ENERGY L. 415 (2016).

53. *See* Dan van der Horst, *NIMBY or Not? Exploring the Relevance of Location and the Politics of Voiced Opinions in Renewable Energy Siting Controversies*, 35 ENERGY POLICY 2705–14 (2007).

on "not-in-my-backyard" kind of thinking, proponents of energy localism are exploring how local participation might enhance energy policymaking.[54]

For some, the benefits of localism lie in the kind of information that can be provided to state and federal policymakers.[55] Local complaints are often signals of more serious problems. Local data collection often provides preliminary evidence of potential violations. Both of these supplement the monitoring efforts of administrative agencies.[56] Moreover, local feedback may provide policymakers with a more accurate picture of the stakes involved in a particular decision.[57] As many scholars have noted, proposed energy projects often "impose significant, uncompensated burdens on communities."[58] Decisions to shift from one energy source to another also threaten the livelihood of certain communities even while they enhance the prospects of another. Allowing for more local input into how energy policies are made then might also lead to better and more informed decisions on the policies themselves.

For others, the promise of energy localism lies in how local regulators might supplement similar efforts at the state and federal level. Rather than displacing local regulations then, the goal might be to expand regulatory powers at the local level and enhance the coordination of local, state, and federal officials.[59] After all, unlike the specialized agencies ordinarily responsible for implementing energy regulations, local governments are general-purpose governments that ordinarily account for a wide-range of interests in rendering their decisions. As such, when local governments exercise their land use and zoning powers over a proposed energy development, they are often doing so on the basis of interests and concerns that may not normally be taken into account by agency officials focused on energy specifically.[60] In addition, local governments necessarily provide many of the supplemental services that energy producers require—from energy services and roads that support their operations, to the schools and social services that support their employees. These burdens not only fall

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54. *See*, *e.g.*, Spence, *supra* note 2.

55. *See* Holly Klick & Eric R. A. N. Smith, *Public Understanding of and Support for Wind Power in the United States*, 35 RENEWABLE ENERGY 1585, 1585 (2010).

56. *See* Hannah J. Wiseman, *Disaggregating Preemption in Energy Law*, 40 HARV. ENVTL. L. REV. 293, 338 (2016).

57. *See* Garrick B. Pursley & Hannah J. Wiseman, *Local Energy*, 60 EMORY L.J. 877, 943–44 (2011).

58. *See* Nolon, *supra* note 1, at 331.

59. *See generally*, Hari M. Osofsky & Hannah J. Wiseman, *Hybrid Energy Governance*, 2014 U. ILL. L. REV. 1 (2014).

60. *See* Nolon, *supra* note 1, at 336.

disproportionately on local communities, but it is only through local regulations that these "secondary impacts" can be managed.[61]

In addition to the information and regulatory benefits, another advantage is that energy localism might fulfill an important civic function.[62] It cannot be denied that energy is part of the fierce partisan battles that have divided this country and stymied policy developments at the state and federal levels. Part of the reason for this is that because energy plays into the urban-rural divide that now defines partisan politics.[63] Another is that many parts of the country feel disconnected from the policymakers responsible for how energy policies are made. Energy localism might then be a way to work through the political stalemates that have arisen. It might do so by decentralizing energy policymaking so that affected residents feel they have more agency in the process.

In short, there are a number of different reasons for the growing interest in energy localism. What ties them together, however, is the promise of participatory democracy as an alternative to agency decision-making in energy law. In other words, energy scholars are turning to local governments because they are the government closest to the people.[64] And this proximity is important because of the belief that local residents are better able to channel their interests and concerns through local officials than those at the state or federal level.[65] The promise of energy localism then lies in the democratic potential of local governments. But what often goes unexplored is whether the local government institutions that currently exist, especially in the rural areas most directly affected by energy developments, actually fulfill these democratic aims. It is to this we now turn.

III. THE LIMITS OF ENERGY LOCALISM

Proponents of energy localism are increasingly looking toward local governments as a means of decentralizing how energy policies are made. But while much of the focus has been on how energy law might be reformed to accommodate the participation of local

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61. Robert H. Freilich & Neil M. Popowitz, *Oil and Gas Fracking: State and Federal Regulation Does Not Preempt Needed Local Government Regulation*, 44 URB. L. 533, 542 (2012) ("only local regulation . . . can deal with the secondary impacts of fracking upon the communities' roads, schools, fire, police, and emergency response systems, as well as preserving offsite environmentally sensitive lands.").

62. *See* S. A. Malin K. T. & DeMaster, *A Devil's Bargain: Rural Environmental Injustices and Hydraulic Fracturing on Pennsylvania's Farms,* 47 J. OF RURAL STUD. 278–290 (2016).

63. *See* Rick Su, *Intrastate Federalism*, 19 U. PA. J. CONST. L. 191, 201 (2016).

64. *See*, *e.g.*, Pursley & Wiseman, *supra* note 54, at 938.

65. *See id*.

governments, little attention has been paid to the legal and organizational structure of the local governments themselves. This Part argues that the prospects for energy localism depend on the democratic capacity of local governments. It suggests, however, that this democratic capacity is limited in significant ways, especially when it comes to the issue of energy.

More specifically, this Part makes three claims. First, decentralization in the energy context depends on the democratic capacity of not only local governments in general, but also the types of local governments that tend to govern in rural areas. Second, the democratic capacity of rural local governments is hampered by legal and structural limitations that limit their role as democratic forums, either in representing the views of their residents or channeling their interests into tangible policies. Third, these limitations are compounded by the type of issues that arise in the context of energy, and the imbalance between rural local governments and the energy industry.

All of this suggests that the prospect of energy localism lies in both energy law and local government law. Indeed, local government reforms may be just as important as decentralizing energy policymaking.

A. Democratic Representation

One of the central goal of energy decentralization is to allow for more local democratic participation in how energy policies are made. And the reason why proponents of energy localism are increasingly looking to local governments is because of the assumption that local governments are quintessential forums for participatory democracy.[66] To be sure, the interests and views of local residents are likely to be represented better by local officials than agency administrators at the state or federal level. Yet it is important to recognize that meaningful representation at the local level is far from guaranteed. This is especially true with respect to energy-related disputes and the type of rural local governments that are frequently involved.

One reason why representation is a concern is relates to the democratic capacity of local governments in rural areas.[67] Most discussions of local governments focus on cities.[68] But in rural areas, the local governments involved are usually counties and towns. And despite the nostalgic image of New England Town Hall Meetings

66. *See*, *e.g.*, *supra* note 63–64 and accompanying text.

67. *See* Su, *supra* note 5, at 847–51.

68. *See id.* at 840.

and their association with American democracy, the kind of political representation offered by counties and towns is often limited.[69] The practice of Town Hall meetings never spread beyond New England states.[70] In vast parts of the country, the lowest level of local governments in rural areas are counties, which govern large geographic areas that often contain many distinct communities.[71] As a result, political power tends to be concentrated in the county seat and among the rural elite.[72] Moreover, counties and towns tend to be legally organized as administrative units of the state government.[73] After elections are held, the role of local leaders tends to be focused on the implementation of state and federal policies in the manner prescribed by state and federal law.[74] Historically and today, rural local governments generally do not play a major role in policymaking or as a forum for resolving controversial issues.

This may be why perceptions of energy issues often reveal vast disconnects between local leaders and their residents. For example, in a study of hazardous waste facilities in Sumter County in Alabama, researchers found that local residents were far more concerned about health and environmental effects than local officials.[75] Moreover, this disconnect was not the result of different levels of information about the facilities. Rather, the researchers found that local officials and their residents viewed the issue through different frames.[76] Given the administrative orientation of rural local governments, local officials viewed the facilities, and other development decisions within the community, largely through the lens of budgeting and revenue-raising.[77] Residents, however, were far more likely to assess the facilities from the perspective of their communities as a whole.[78] Thus, although fiscal considerations were important, they were also more attuned to the societal and environmental costs as well. As a result, the

69. *See id*. at 857–58.

70. *Id.* at 856.

71. *Id.* at 855.

72. *See id.* at 856.

73. *See id*. at 857–58.

74. *See id*. at 858.

75. Conner Bailey et al., *Hazardous Wastes and Differing Perceptions of Risk in Sumter County, Alabama*, 5 SOC'Y & NAT. RESOURCES 21, 29 (1992).

76. *See id*. at 22.

77. *See id*. at 32–33.

78. *See id*. at 30.

researchers concluded that the views and actions of local officials may not always reflect the interests of residents and their community.[79]

If the legal and political structure of rural local governments raises concerns about their representation of local residents, another concern is the degree to which they are able to give voice to *all* residents, including the poor, racial minorities, and those who have historically been marginalized in local politics. From this perspective, the fact that local residents vote for their local officials is not enough to ensure participatory democracy. Also important is how local democratic practices foster the kind of cross-cutting negotiations that can bring to the forefront the uneven impacts of energy policies on the residents of a particular local community.

To see why this is important requires us to recognize that energy development does not simply exert uneven and localized impacts between communities. Their costs and benefits can also be unevenly apportioned within communities, and frequently in a manner that correlates with existing social and geographic divides. Those who are employed by an energy producer, for example, are not necessarily the same residents as those who bear the environmental or health effects of its operations. The broader community that benefits from the tax revenue that an energy operation generates may not share the same concerns as the neighborhoods immediately bordering such an operation. And too often, these divisions are drawn along existing racial and class lines.

Take, for example, the community of Diamond, Louisiana. Diamond is located in the state's chemical corridor and is nestled between the Mississippi River and two oil refineries.[80] It is also a predominantly African-American community, separated by railroad tracks from the white neighbors who live on the other side.[81] For decades, the residents of Diamond had endured emissions from the refineries and elevated rates of cancer and other ailments.[82] They have also borne the cost of industrial accidents, including an explosion resulting from a chemical discharge that leveled a home and killed two residents.[83]

Given these localized impacts, it would appear that Diamond would be a prime candidate for expanding local control over energy developments. But Diamond does not have a local government. Rather, it is an unincorporated area in Plaquemines Parish, a

79. *See id.* at 23.

80. LERNER, *supra* note 37, at 9.

81. *Id.* at 26, 141.

82. *Id.* at 45–56.

83. *Id.* at 29–30.

county-equivalent local government in Louisiana.[84] And within the parish as a whole, feelings about the refineries are split along racial and—because of the long legacy of segregation—geographic lines.[85] The refineries employ mostly white residents, most of whom live far enough away to avoid its most significant impacts and, in fact, know little about them.[86] At the same time, very few of the black residents of Diamond who suffer the environmental harms of the refineries have been able to secure employment there.[87] Thus, when residents of Diamond mobilized to compel the refinery to buy-out their homes so that they could relocate elsewhere, their efforts were widely criticized by the white residents of Plaquemines Parish.[88]

None of this is to suggest that local input and participation is not important. If Plaquemines Parish was callous to the concerns of Diamond, there was no evidence that the state or federal governments were more attentive.[89] But it does suggest that the goal of expanding local autonomy requires more than simply empowering local governments to play a bigger role in regulating energy. It might also mean ensuring that minority voices are heard in the local democratic process, and local forums are available for negotiating the kind of uneven impacts that energy developments can have within a given community.

B. Local Authority

If one concern with energy localism is the ability of rural local governments to serve as effective representatives of the people that they serve, another is their ability to channel residents' concerns into tangible policies. In other words, do counties and towns have the power or authority to regulate energy operations within their jurisdiction and the effect of those operations on the lives of their residents? The concern here is not simply the preemption statutes that explicitly prohibit local governments from regulating a specific energy industry, which energy scholars have begun to raise concerns about. It is also whether local governments

84. Diamond a neighborhood in the "town" of Norco. *See id*. at 141, 146. But the town of Norco is also not an incorporated locality, and thus has no local government. Rather it is simply a "census designated place" within St. Charles Parish. *See* https://en.wikipedia.org/wiki/Norco, Louisiana. The lowest level of government here is St. Charles Parish.

85. *See id*. at 141.

86. *See id*. at 61, 95.

87. *See id*. at 12, 61.

88. *See id*. at 194–95.

89. *See id*. at 258.

in general, and rural local governments more specifically, have the baseline authority to address energy issues even in the absence of an express preemption statute.

At this point, it is important to acknowledge the limited authority of local governments, and of rural counties and towns in particular. After all, under American law, local governments are mere creatures of the state.[90] What this means is that they possess only those powers that are specifically delegated to them by the state.[91] And in addition, the state ordinarily has substantial power to revoke powers that have been granted or preempt local policies through state legislation.[92] And although this basic framework applies to all local governments, rural local governments like counties and towns tend to be especially disadvantaged.[93] As noted earlier, counties and towns were historically created as administrative subdivisions of the state.[94] As a result, the powers delegated to them tend to correspond with the implementation of state laws and programs, rather than the development of local policies.[95] Moreover, while the home rule movement expanded local authority in many states, home rule authority often excludes rural local governments or is extended in a more limited manner.[96]

The baseline limitations of rural local government authority are further compounded in the energy context. In most states, energy law is a field that is considered wholly occupied by the state, leaving no room for local regulations.[97] Similarly, few states grant localities, much less towns and counties, explicit authority to regulate energy, which is especially significant because local governments can only act when power has been explicitly delegated.[98] Even in those states where broad home rule authority has been extended to rural local governments like counties and towns, that home rule authority tends to be limited to matters of municipal, rather than statewide,

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90. *See*, *e.g.*, Hunter v. City of Pittsburgh, 207 U.S. 161, 178 (1907).

91. *See*, *e.g.*, H.G. Brown Family Ltd. v. City of Villa Rica, 607 S.E.2d 883, 885 (Ga. 2005) ("A municipality has no inherent power; it may only exercise power to the extent it has been delegated authority by the state. A municipality's allocations of power from the state must be strictly construed.").

92. *See* Richard Briffault, *Our Localism: Part I—The Structure of Local Government Law*, 90 COLUM. L. REV. 1, 1 (1990); Richard Briffault, *The Challenge of the New Preemption*, 70 STAN. L. REV. 1995, 2004–05 (2018).

93. *See* Su, *supra* note 5, at 870–71.

94. *See supra* note 72.

95. *See supra* note 73.

96. Su, *supra* note 5, at 863–65.

97. *See*, *e.g.*, Wiseman, *supra* note 1, at 324–25.

98. *See*, *e.g.*, John F. Dillon, Treatise on the Law of Municipal Corporations §§ 17, 89.

affairs.[99] The line between municipal and statewide affairs has long been notoriously difficult to draw.[100] But the fact that energy has so long been considered to be a matter of state and national concern leans against a finding that it is within traditional home rule authority as a local affair rather than a state-wide concern.[101] All of these limitations are further exacerbated by the fact that many states explicitly preempt local regulations with respect to specific energy policy.[102]

There is, of course, one exception to general lack of local authority: the local power to indirectly regulate energy through land use controls like zoning.[103] Indeed, because zoning has long been construed as a quintessential local power, most accounts of energy localism are focused on the use of this power at the local level.[104] And local communities have long turned to land use controls to address broader energy issues, from nuclear power and unconventional gas drilling, to ethanol, wind, and solar. As a result, proponents of energy localism have likewise focused on the zoning power as well.[105]

But local reliance on zoning also reveals the limits of energy localism. More specifically, it highlights the dearth of legal tools that local governments possess when it comes to the regulation of energy more generally. If local governments turn to zoning, it is because they have little authority to regulate energy production directly. If concerns about the environmental or economic impacts need to be reframed through the lens of land use in the energy context, it is because land use concerns are commonly presumed to be one of the few concerns that should be subject to local considerations. The fact that zoning looms so large in energy law is testament to how little existing law is entrusted to the local democratic process.

It also doesn't help that the zoning power distorts the involvement of local residents in energy law and policy. Zoning is reactive, not proactive. It grants local residents a means to oppose energy operations that have been proposed, but limited means to

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99. *See*, *e.g.*, Gerald E. Frug, *The City as a Legal Concept*, 93 HARVARD LAW REVIEW 1057, 1117 (1980).

100. *See*, *e.g.*, Daniel B. Rodriguez, *Localism and Lawmaking*, 32 RUTGERS L.J. 627, 632, 639 (2001).

101. *See*, *e.g.*, Sarah Fox, *Home Rule in an Era of Local Environmental Innovation*, 44 ECOLOGY L.Q. 575, 596–97 (2017–2018).

102. *See, e.g.*, Keith B. Hall, *When Do State Oil and Gas or Mining Statutes Preempt Local Regulation*, 27 NAT. RESOURCES & ENV'T 13, 13 (2012–2013); Hannah J. Wiseman, *Disaggregating Preemption in Energy Law*, 40 HARV. ENVTL. L. REV. 293, 303–04 (2016).

103. *See* Spence, *supra* note 2, at 372.

104. *See*, *e.g.*, Nolon, *supra* note 1, at 335; Spence, *supra* note 2, at 387; Wiseman, *supra* note 1, at 303.

105. *See* Wiseman, *supra* note 1, at 325.

guide or incentivize energy development more generally. As a regulation of energy, it is also indirect and binary. It allows local communities to dictate whether a specific energy facility is allowed, but not necessarily how that energy facility might operate or what actions needs to be taken once operations ceases. Indeed, efforts by localities to use the zoning power to regulate how energy facilities operate have routinely been rejected by courts as outside of the scope of that power.[106] Moreover, the traditional reliance on zoning contributes to the perception that local involvement in energy regulations will largely result in widespread obstruction based on "not-in-my-backyard" sentiments. As noted earlier, local perceptions about energy are often nuanced and complicated.[107] But when expressed solely through the framework of zoning, the kind of balanced regulations that residents might tailor for their communities may not be possible.

Thus far, we have looked at the legal limits of local power when it comes to energy. But perception matters as well. In many cases, the exercise of local authority is not only limited by the formal powers that have been delegated, but by how local officials understand their role in setting policy. Studies have shown that local officials routinely believe they have less authority than they do,[108] whether because of a genuine misunderstanding of the law or perhaps as a strategic posture to deflect responsibility for taking action. Local officials are also extraordinarily cautious, wary of prompting preemptive action by the state legislature or incurring litigation costs in defense of their authority.[109] There is also the fact that unlike cities, rural, local governments often lack the resources, staff, or experience in dealing with complex policy issues.[110] Taken together, local officials often undertake less regulatory activity than they might be able to. Given the added uncertainty when it comes to energy, and the political influence and litigiousness of the energy industry, it makes sense that many local officials tend to refrain from regulating in this area even if a plausible case can be made regarding their authority to do so. In turn, local residents assume that no actions can be taken, further entrenching the perception that they are powerless.

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106. *See*, *e.g.*, State ex rel. Morrison v. Beck Energy Corp., 143 Ohio St.3d 271, 277–78 (2015).

107. *See infra* Part I.B.

108. *See*, *e.g.*, DAVID J BARRON ET AL., DISPELLING THE MYTH OF HOME RULE 11 (2004).

109. *See*, *e.g.*, Rick Su, *Have Cities Abandoned Home Rule*, 44 FORDHAM URB. L.J. 181, 201 (2017).

110. *See* Colter Ellis et al., *Unconventional Risks: The Experience of Acute Energy Development in the Eagle Ford Shale*, 20 ENERGY RESEARCH & SOCIAL SCIENCE 91, 92 (2016).

In short, for energy localism to succeed, rural local governments must be granted clear authority to regulate energy in a way that can adequately reconcile the competing and nuanced interests of their residents. Moreover, local officials and local residents need to feel that they are empowered and entitled to act, and develop experience in doing so. Both of these are currently lacking in the context of rural local governments. As a result, these are also considerations that must be factored into the movement for energy localism.

C. External Relations

We have looked at the representative capacity of rural local governments. We have also considered their baseline legal authority and the limitations that rural local governments face in translating the will of local residents into tangible and effective policies. The third issue with the role of local governments in energy localism is how rural local governments deal with external parties.

On the one hand, rural local governments are often at a disadvantage when it comes to their dealings with the energy industry. Energy companies have long played an outsized role in energy policymaking, given their economic resources, clout, and political influence.[111] This outsized role is only magnified in rural communities, where energy companies are tied to their economic, cultural, and governmental identities. All of this affects the ability of rural local governments to act as an effective regulator of the energy industry, or a faithful representative of their resident's interests.

One reason for the influence of energy companies on local politics is economic dependence. Because energy companies often play an outsized role in the economic well-being of communities, it is those companies interests that end up being represented the most in local politics.[112] In some communities, a particular energy sector may be the largest employer such that most residents believe that the success of that community is tied to the success of that company.[113] That dependency may even have long historic roots, given that many communities tied to the energy sector began as company towns that were developed and settled at the direction of the

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111. *See*, *e.g.*, Charles Davis, *The Politics of "Fracking": Regulating Natural Gas Drilling Practices in Colorado and Texas*, 29 REVIEW OF POLICY RESEARCH 177, 178 (2012).

112. *See*, *e.g.*, Shannon Elizabeth Bell, *"There Ain't No Bond in Town Like There Used to Be": The Destruction of Social Capital in the West Virginia Coalfields1*, 24 SOCIOLOGICAL FORUM 631, 633–34 (2009).

113. *See*, *e.g.*, annon Elizabeth Bell & Richard York, *Community Economic Identity: The Coal Industry and Ideology Construction in West Virginia: Community Economic Identity*, 75 RURAL SOCIOLOGY 115 (2010).

company itself.[114] As a result, local officials commonly see their role as one that is primarily aligned with the interest of the energy companies that support their community.[115] And local residents often feel disempowered in their dealings with the energy sector.[116]

Even when economic dependence fades, energy companies have developed strategies for maintaining their influence and control of local politics. One way they have done so is by fostering local identities aligned with the energy industry. This is precisely what Bell and York observed in their study of coal mining in West Virginia.[117] The economic significance of coal mining had been in decline for decades, accounting for only about 7 percent of the state's gross domestic product in 2004.[118] But when environmental concerns about coal mining began to arise, the coal industry began an intensive push to increase local identification with the coal industry through "grassroots" organizations, local sponsorships, and appropriation of cultural icons.[119] And the effort largely succeeded, generating local support that was much less concerned with economic dependency than the perception that the coal industry was connected to local identities. As a result, Bell and York concluded that "it is far from uncommon for communities to identify with industries that do not do much to support local and regional economies."[120] And the reason for this, they explained, was because "owners and managers of extractive industries actively construct, maintain, and amplify community economic identity in order to ensure that certain ideologies dominate in communities that historically depended on natural-resource extraction, thereby averting a legitimation crisis."[121]

On the other hand, rural local governments face challenges in their dealings with other local governments. We have seen how energy operations can affect different parts of a community different ways. Equally important is how energy developments can also exert externalities on neighboring communities that may not be fully accounted for by a single local government. In other words,

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114. *See*, *e.g.*, *generally*, CRANDALL A. SHIFFLETT, COAL TOWNS: LIFE, WORK, AND CULTURE IN COMPANY TOWNS OF SOUTHERN APPALACHIA, 1880–1960 (1991).

115. *See*, *e.g.*, BRIAN K. OBACH, LABOR AND THE ENVIRONMENTAL MOVEMENT: THE QUEST FOR COMMON GROUND 10 (2004).

116. *See* Malin & DeMaster, *supra* note 63, at 283–84.

117. *See* Bell & York, *supra* note 115.

118. *Id.* at 121.

119. *Id.* at 129–38.

120. *Id.* at 118.

121. *Id.* at 117.

proponents of energy localism must also be attentive to the regional impacts of energy policies and consider the local capacity for regional coordination and cooperation.[122]

Inter-local cooperation has long been a concern in the local government literature.[123] The problem, simply stated, is that there are too few instances of negotiations and coordination between localities. Sometimes this is because of outright competition between communities—for residents, for businesses, for tax revenue.[124] Other times, the issue arises because of the lack of institutional forums or frameworks in which inter-local negotiations can take place.[125] As a result, local government scholars have long advocated reforms to existing local government structures to promote a more regional outlook—one in which localities recognize their interests in the success of the entire region, and where local governments are organized so that regional cooperation can more readily occur.[126]

Thus far, however, the regionalism movement has largely focused on metropolitan regions, and city-suburb relations more specifically.[127] But might it also be important in the rural context and with respect to energy? Many impacts of energy development are concentrated within a local jurisdiction, if not specific neighborhoods within them. But others have extra-territorial effects. Fracking operations may increase traffic not only in a specific county, but also those that surround them. Refineries may pollute waterways with tremendous downstream effects. An ethanol plant might provide economic opportunities to farmers in many counties, even if the tax benefits are concentrated in one. Might decisions about these projects benefit from regional cooperation and coordination? Races-to-the-bottom might be reduced. Broader perspectives might be introduced without sacrificing all local input to state or federal policymakers.

The problem, however, is that even more so than metropolitan communities, rural local governments lack the resources and institutional support for regionalism. Largely organized as service-

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122. *See* Hannah Wiseman, *Expanding Regional Renewable Governance*, 35 HARV. ENVTL. L. REV. 477, 483 (2011).

123. *See*, *e.g.*, Juliet F. Gainsborough, *Bridging the City-Suburb Divide: States and the Politics of Regional Cooperation*, 23 JOURNAL OF URBAN AFFAIRS 497, 497–98 (2001).

124. *See*, *e.g.*, *id*. at 498; Sheryll D Cashin, *Localism, Self-Interest, and the Tyranny of the Favored Quarter: Addressing the Barriers to New Regionalism*, 88 GEO. L.J. 1985, 1993 (1999).

125. *See*, *e.g.*, Richard Briffault, *Localism and Regionalism*, 48 BUFF. L. REV. 1, 4–5 (2000).

126. *See*, *e.g.*, Laurie Reynolds, *Intergovernmental Cooperation, Metropolitan Equity, and the New Regionalism*, 78 WASH. L. REV. 93 (2003).

127. *See* Su, *supra* note 5, at 840.

delivering subdivisions, counties and towns often lack the resources or capacity to engage in collaborative efforts. This is what researchers discovered in their interview of local leaders dealing with the boom in unconventional gas extraction able the Eagle Rock Shale in southern Texas.[128] Lacking an effective inter-local framework for cooperation, the counties involved had difficulties finding a way to coordinate a regional response.[129] A regional working group was eventually organized,[130] but ironically, that working group was put together, and in many ways managed, by the energy industry themselves.[131] The local officials were grateful for the resources and organizing capacity that the energy sector was able to provide to their coordinating efforts.[132] But it is interesting to note that the lack of an inter-local framework for regulating energy ultimately reinforced the dependence of rural local governments on the energy sector.[133]

IV. STRENGTHENING ENERGY LOCALISM

Energy localism promises to expand the role of participatory democracy in energy policymaking. One challenge that it faces, however, is democratic capacity of rural local governments. I have suggested that rural counties and towns, as they are currently constituted, often do not effectively represent their residents, lack the power to act on their behalf, and are beholden to industry interests. For energy localism to succeed then, it is not enough to simply decentralize how energy policies are made. Steps must also be taken to overcome the limitations that hobble local governments in general, and rural local governments in particular.

First, efforts to expand energy localism should be structured to ensure that local residents are adequately represented—and not just the interests and concerns of a local majority, but also those of minority groups that may be uniquely affected. To that end, it is not enough that energy policymaking welcomes the participation of local officials. It is also important to ensure that local officials are actually representing the interests of their communities. This might mean that decentralization efforts carefully consider which local institutions are selected to participate, be it counties, towns, or other local government units. Or perhaps procedural requirements

128. *See* Ellis et al., *supra* note 112, at 92.

129. *See id*. at 96.

130. *See id*.

131. *Id.*

132. *See id*.

133. *See id*.

might be imposed, like requirements that counties hold hearings in the community where an energy development operates or is proposed. Indeed, it might even be necessary in some cases to reconsider the size and representative structure of rural local governments themselves. This might seem daunting. It certainly expands energy localism beyond the already difficult task of reforming energy law. But as this essay has argued, energy scholars cannot assume that transferring power and influence over energy policies to local governments will necessarily produce the kind of decentralization that energy localism promises. Moreover, the promise of expanded power or influence over energy might itself serve as a powerful incentive to encourage states and local governments to reform their democratic processes and ensure the representation of affected residents. In this regard, energy localism might be the catalyst for localism more generally.

Second, energy localism should also be attentive to the authority of local governments, especially those in rural areas. In other words, it is not enough to simply remove the state and federal preemption laws that prevent local governments from regulating energy generally or in a specific area. It is also important to consider whether, absent those explicit statutory prohibitions, local governments have the baseline authority to address energy-related issues. In some states, this might involve urging courts to interpret the local authority that has already been delegated to include local efforts to address energy developments and operations. In other states, state legislatures might be encouraged to delegated authority explicitly over a particular energy issue or a specific industry. Moreover, consideration should be given to exercises of local authority beyond traditional land use controls. To be sure, land use powers provide vetoes, and vetoes are important tools in managing the costs and benefits of proposed energy developments. But vetoes are also blunt tools, and do not provide as much flexibility as direct regulatory authority. If the goal is to empower local communities to address the varied and competing local interests with respect to energy, then it may also be necessary to grant them the regulatory tools to develop tailored and innovative solutions.

Last, steps will need to be taken to balance the influence of the energy industry on local politics. Efforts to enhance the representative capacity and baseline authority of rural local governments are likely to help here as well. Both would enhance the voice of marginal residents and grant them leverage in negotiations over concerns. Further reforms, however, may also be necessary. For example, other regulatory bodies, like administrative agencies

or energy commissions, may need to actively support local residents from above, offering a potential counterweight to private companies that operate on a regional scale. The problem with this, of course, is that these regulatory bodies themselves are often vulnerable to industry capture. Another possibility is to expand the role of the public energy sector. Like the expansion of public utilities at the turn of the twentieth century, perhaps local governments should be given more power to play a role in the energy sector with respect to production and distribution. This would grant local residents an alternative means, other than regulation, to determine the extent and manner in which energy projects are operated. It might also alter the balance of local interests by ensuring that the benefits of energy facilities are directly captured by the local communities that bear the burden.

V. CONCLUSION

The rise of energy localism is challenging the traditional view of energy law as a specialized field based on centralized policymakers, administrative rule-making, and an exclusive focus on the national interest. But the growing interest in the involvement by local governments must be tempered with the realities of local governance on the ground. If local governments are to play a meaningful role in the decentralization of energy law, then efforts must also be made to expand their democratic capacity and baseline authority. This is especially true with respect to the rural local governments that are so often at the center of energy disputes.

VISIBILITY AND INDIVISIBILITY IN RESOURCE ARRANGEMENTS

LEE ANNE FENNELL*

Projects like highways, bridges, pipelines, and wildlife corridors exhibit indivisibilities—we need the whole thing to have anything of value. Many environmental and social goals have a similar all-or-nothing character: staying above or below a certain critical threshold can make all the difference. This Essay focuses on the role of visibility in addressing resource dilemmas that have this structure. I examine how two kinds of visibility can help avoid catastrophic consequences and advance desirable ones. The first involves recognizing when an indivisibility is present—that is, appreciating the vulnerability of resources to thresholds and cliff effects before it is too late. The second involves seeing how individual decisions about resources stack together to generate outcomes. When a resource problem suffers from poor visibility along these dimensions, finding ways to clear the view can improve the prospects for cooperative solutions.

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* Max Pam Professor of Law, University of Chicago Law School. I (virtually) presented a version of this essay as the Fall 2020 Distinguished Lecture at Florida State University College of Law as part of its Program on Environmental, Energy, and Land Use Law, and I am grateful to the participants in that event for their helpful comments and questions. For additional thoughtful suggestions and conversations, I thank Hanoch Dagan, Avihay Dorfman, Hajin Kim, Jonathan Masur, Richard McAdams, Arden Rowell, Erin Ryan, and participants in Tel Aviv University's Private Law Theory Workshop. Research support from the Harold J. Green Faculty Fund and the SNR Denton Fund is also gratefully acknowledged.

V. CONCLUSION..... 332

I. INTRODUCTION

What we can see changes what we can do. The intuition is simple, but its implications are profound. Nowhere is this more true than in environmental, land use, and natural resource contexts, where collective action problems abound but their shapes—and those of their solutions—often remain obscure. This essay emphasizes the role of *visibility* in taking on these challenges.[1] By visibility, I mean two distinct things: perceiving the structure of a given resource dilemma, and seeing how dispersed individual choices influence it.[2]

Seeing a resource dilemma's structure means more than recognizing the existence of a problem worth addressing—often a challenge in its own right.[3] It also means apprehending whether the problem has an all-or-nothing character, exhibits cliff or threshold effects, or involves increasing or decreasing returns to scale. Features like these are associated with *indivisibilities*—instances in which a given good is very costly to divide or is much less valuable when divided than when kept whole.[4] Highways, bridges, pipelines,

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1. The significance of visibility in environmental and other collective action contexts has long been recognized. *See, e.g.*, Robert C. Cass & Julian J. Edney, *The Commons Dilemma: A Simulation Testing the Effects of Resource Visibility and Territorial Division*, 6 HUM. ECOL. 371 (1978); Bonnie J. McCay, *Everyone's Concern; No One's Responsibility: A Review of Discourse on the Commons*, conference draft, Annual Meeting of the Society for Applied Anthropology, 10–11 (1984); Barton H. Thompson, Jr., *Tragically Difficult: The Obstacles to Governing the Commons*, 30 ENV'T. L. 241, 242–43, 265 (2000); Monika Ehrman, *Application of Natural Resources Property Theory to Hidden Resources*, 14 INT'L. J. COMMONS 627 (2020).

2. These two kinds of visibility track distinctions about information conditions in the game theory literature. *See* DOUGLAS G. BAIRD, ROBERT H. GERTNER & RANDAL C. PICKER, GAME THEORY AND THE LAW 9–10 (1994). Whether a game's structure—its payoffs and available strategies—are known to the players determines whether the game is one of complete or incomplete information. *Id.* at 10. Whether the strategies or "moves" actually selected by the other players are observable determines whether the game is one of perfect or imperfect information. *Id.* If both structures and choices are known to the parties, the game is one of complete and perfect information. *Id.* The notion of visibility pursued in this paper focuses on how the information environment for a strategic interaction might be improved along these two dimensions.

3. *See, e.g.,* Thompson, *supra* note 1, at 258–59 (noting that fisheries, groundwater, and climate change "[a]ll involve hidden resources," which can lead people to ignore or downplay problems); Kate Pride Brown, *Water, Water Everywhere (Or Seeing Is Believing): The Visibility of Water Supply and the Public Will for Conservation*, 12 NATURE & CULTURE 219, 224–25, 235 (2017) (discussing problems of groundwater invisibility); *see generally* ARDEN ROWELL & KENWORTHEY BILZ, THE PSYCHOLOGY OF ENVIRONMENTAL LAW (2021) (discussing factors that make environmental harms difficult to see, understand, and care about).

4. *See* H. Peyton Young, *Dividing the Indivisible*, 38 AM. BEHAV. SCI. 904, 904, 906 (1995) (observing that the notion of indivisibility does not generally refer to the literal impossibility of division, but rather to the cost or loss of value associated with splitting something up).

and wildlife corridors have an indivisible character—one needs the entire thing in order to have much of value. Similar indivisibilities lurk in environmental goods (or bads)[5] that depend on aggregations or accumulations—the minimum viable population required to sustain a species, for example, or the critical threshold that a pollutant concentration cannot exceed without devastating effects. In other words, there is often a "lumpy" rather than smoothly linear relationship between inputs and outcomes.[6] Recognizing the shape of the problem is essential to solving it.

Seeing the impact of individual choices on a resource dilemma requires another type of visibility—apprehending how innumerable small, dispersed, interacting decisions stack together to produce real-world impacts. In some contexts, the way that individual decisions aggregate is easy to track and view. For example, if a particular string of land parcels is necessary to create a wildlife corridor, each of the owners along that path holds an essential element. But in many environmental contexts, the effects of human choices are diffuse, mobile, and sometimes literally invisible. The inability to get real-time feedback about choices and their effects can thwart attempts at coordination. Nonetheless, we can consciously construct focal points and ways of visualizing cumulative impacts, even when these are not naturally part of the observable landscape.[7]

This Essay proceeds in three stages. Part II discusses how indivisibility changes the nature of a collective action problem and upends the predictions that might follow from a tragedy of the commons template. Part III examines the structure of resource dilemmas that feature indivisibility. Understanding this structure, and recognizing how it influences the strategies of the players, is an important first step in addressing resource dilemmas that involve thresholds, cliff effects, or lumpy all-or-nothing outcomes. Part IV turns to the role of visibility in compiling the cooperation necessary to resolve indivisible problems.

The analytic building blocks that I use in this piece are familiar to those working on collective action problems using economics and game theory. What I hope to do here is show how these ideas apply to environmental and natural resource contexts, where indivisibilities typically loom large and visibility is often low. The indivisibilities in these contexts can threaten great harm, such as

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5. *See, e.g.,* RUSSELL HARDIN, COLLECTIVE ACTION 61–62 (1982) (defining "collective bads"). Collective action problems in environmental contexts often involve the avoidance of "bads" as well as the provision of "goods."

6. *See* LEE ANNE FENNELL, SLICES AND LUMPS: DIVISION AND AGGREGATION IN LAW AND LIFE 9–26 (2019); Michael Taylor & Hugh Ward, *Chickens, Whales, and Lumpy Goods: Alternative Models of Public-Goods Provision*, 30 POL. STUD. 350, 353 (1982).

7. *See infra* Part IV.C.

the total collapse of a fishery. But they also represent underappreciated sources of opportunity, because they change the game from one in which everyone does best by defecting to one in which each player's best strategy depends on what she expects others to do. Forming expectations can be difficult, however, because environmental and natural resource problems often suffer from poor visibility—their shapes are ill-defined and contributions to addressing them are often unobservable. Finding ways to clear the view can help avoid catastrophic results, but because it may also enable some parties to take advantage of others (and cause others to fear being suckered), norms retain an important role in supporting cooperative action.

II. UNDERSTANDING INDIVISIBILITY

When most people think about problems involving resources, the tragedy of the commons springs immediately to mind.[8] The standard story tells us that herders with access to a common pasture will tend to overgraze it because they internalize all of the benefits of putting more livestock into the field but bear only a fraction of the costs that are visited on the pasture when they do so.[9] The mental template is a powerful one with a memorable, clear, and ultra-depressing prediction: that everyone will pursue an individually rational, but socially destructive, dominant strategy.[10]

Fortunately, reality rarely resembles this model. Social norms, repeat play, and other factors often intervene to change the payoffs that people face and hence the strategies that they will pursue. Elinor Ostrom's work explored many of the design features through which local institutions can avert tragedy in managing common pool

8. This framework is often associated with Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE, n.s.1243 (1968). The roots of the idea reach back much further. *See, e.g.,* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 2–3 (1990) (discussing antecedents, including in the work of Aristotle); H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62 J. POL. ECON. 124, 128–35 (1954) (analyzing common pool resource problems in fisheries and noting parallels in other resource contexts).

9. *See, e.g.*, Lee Anne Fennell, *Commons, Anticommons, Semicommons*, in RESEARCH HANDBOOK ON THE ECONOMICS OF PROPERTY LAW 35, 35–41 (Kenneth Ayotte & Henry E. Smith, eds., 2011) (discussing and critiquing this account).

10. *See, e.g.*, *id*.

resources.[11] In this Part, I focus on a structural reason why many resource dilemmas look nothing like the standard tragedy of the commons: the presence of indivisibilities.

A. What Indivisibility Means

Bridges, pipelines, and highways offer intuitive examples of indivisible goods. Although it would be physically possible to divide them up or remove segments from them, doing so would have a disproportionately negative impact on their value.[12] A ten-meter segment of a kilometer-long bridge only represents one percent of the span's total length, but removing it leaves behind something that is not 99% as good, but rather utterly worthless, at least as a bridge.[13] Even where it's trivially easy to remove an integral part—one card from a deck, one piece from a jigsaw puzzle, or one cog from a machine—doing so would destroy value because those goods are designed to work as indivisible wholes. Note also that indivisibility applies conceptually even when the whole has not yet been realized: stopping construction of a bridge when it is 99% complete defeats the purpose of building the bridge altogether, because bridges are useful only in whole-bridge units.[14]

Many environmental resources and problems lack the concreteness of a bridge or a jigsaw puzzle but share a similarly indivisible structure—taking away a portion of the resource, or failing to supply an element necessary to its continuing viability, can have catastrophic effects. Sometimes this all-or-nothing structure is just as evident as it is for any highway or bridge. Consider, for instance, the Path of the Pronghorn, a designated migratory route between Wyoming's Green River Valley and Grand

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11. *See generally*, OSTROM, *supra* note 8. Although these small-scale solutions may be successful in preventing the destruction of the common pool resource, it is worth emphasizing that some of them can embed oppression, hierarchy, and self-dealing—as Ostrom herself recognized. *See, e.g.*, Duncan Law & Nicole Pepperell, *Oppression in the Commons: Cautionary Notes on Elinor Ostrom's Concept of Self-Governance*, in The Australian Sociological Association (TASA) 2018 Conference Proceedings: Precarity, Rights, and Resistance 7 (Grazyna Zajdow, ed., 2018) (discussing passages in Ostrom's writing that recognize such risks); Carol M. Rose, *Thinking About the Commons*, 14 INT'L J. COMMONS 557, 561 (2020) (observing that "many traditional communities are shot through with layers of hierarchy, and especially with norms about gender roles.").

12. *See* Young, *supra* note 4, at 906.

13. Dismantling it (at some cost) would yield only scrap materials. *Cf.* CHARLES R. FRANK, JR., PRODUCTION THEORY AND INDIVISIBLE COMMODITIES 32 (1969) (illustrating indivisibility by observing that splitting up "an industrial heat exchanger with a two-million-ton capacity" yields "two piles of steel scrap and other debris," not "two heat exchangers with a capacity of a million tons apiece").

14. *See* Taylor & Ward, *supra* note 6, at 353 (noting that goods like bridges "cannot be usefully provided in *any* amounts but only in more or less massive 'lumps'").

Teton National Park.[15] Protecting a contiguous path requires a series of highway underpasses and overpasses as well as careful attention to the hundreds of fences the pronghorn encounter along the way.[16] Even one unnavigable segment would thwart the annual migration and threaten the pronghorn's survival—a point central to a petition recently filed in federal district court to challenge the Bureau of Land Management's decision to permit gas wells along the route.[17] Indivisibility changes the stakes and the nature of the dispute: the alleged disruption is not simply a small fraction of an animal's wide-ranging territory, but rather an essential segment of a larger whole.[18]

As this example suggests, whether a given resource problem is viewed as exhibiting indivisibilities is itself open to interpretation and construction. The answer depends not just on physical realities (the interconnectedness of nature, or the effects of gravity on cars trying to cross an incomplete bridge) but also on how we define the relevant goal, and what counts as success or failure in achieving it.[19] For example, what might seem like just a marginal diminution in wildlife overall takes on an all-or-nothing character if we focus on preventing the extinction of a particular species. Reframing problems in ways that emphasize indivisibilities can raise the stakes (e.g., make the situation an all-or-nothing one) and, potentially, help harness cooperation.[20]

Indivisibilities lurking in some resource systems may be difficult to detect. For example, if a fishery requires a certain minimum population level for a given species to remain sustainable, fishing that drops the breeding population below that level will eliminate

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15. *See, e.g.*, MARY ELLEN HANNIBAL, THE SPINE OF THE CONTINENT: THE RACE TO SAVE AMERICA'S LAST, BEST WILDERNESS 204–06 (paperback ed., 2013); Paul Tolmé, *Running the Gauntlet*, in *Conservation*, NAT'L WILDLIFE FED'N (June 1, 2019) https://www.nwf.org/Magazines/National-Wildlife/2019/June-July/Conservation/Habitat-Corridors.

16. *See* Tolmé, *supra* note 15. Pronghorn do not jump fences, so they need to be able to go *under* any fences across their route. *See* HANNIBAL, *supra* note 15, at 205.

17. Amended Petition for Review of Agency Action, Upper Green River All. v. U.S. Bureau of Land Mgmt., No. 2:19-cv-146-SWS (D. Wyo., Feb. 19, 2020). *See* Cassidy Randall, *"They Won't Survive": Trump Gas Wells Would Block Pronghorn Migration Route*, THE GUARDIAN (Feb. 24, 2020) https://www.theguardian.com/environment/2020/feb/24/pronghorn-migration-gas-wells.

18. For more background on the ecology of wildlife corridors and the significance of connectivity, *see generally*, JODI A. HILTY ET AL., CORRIDOR ECOLOGY: LINKING LANDSCAPES FOR BIODIVERSITY CONSERVATION AND CLIMATE ADAPTATION (2d ed. 2019).

19. Of course, there may be foundational normative disagreements about the ends to be sought or the evaluative framework to be employed in assessing progress. For instance, conservation might be sought for reasons wholly unrelated to human welfare. The visibility analysis developed here does not require or rule out any particular way of defining goals, and the examples I give are meant to be illustrative rather than prescriptive.

20. *See infra* Part II.B.

that species from the resource system—a dramatic collapse.[21] But such a population crash often follows some period in which exploitation of the resource has little or no perceptible negative effect.[22] As Carol Rose puts it, "it is typical of environmental problems that they really are *not* problems at the outset."[23] Moreover, even after declines become observable, they may be deceptive—there may be a period during which the decline is fairly modest and unalarming. But the losses may begin to snowball rapidly as the critical mass necessary to sustain the population is broken apart through overextraction. Similar threshold effects exist in multiple environmental contexts: coral reefs can suffer devastating collapses when contaminants or temperatures reach a certain critical level; small ocean temperature changes can trigger a dramatic increase in hurricanes.[24]

In cases like these, indivisibilities exist and strongly influence the potential for disastrous outcomes. But they may remain largely invisible to observers—until it is too late. A tragic example of this phenomenon can be found in the fate of the passenger pigeon, which was at one time the most common bird in North America, with massive flocks darkening the skies and populations numbering in the billions.[25] But intensive hunting quickly drove the passenger pigeon to extinction; the last surviving member of the species, Martha, died in the Cincinnati Zoo in 1914.[26] Because the passenger pigeon was a migratory species, it was only present intermittently in any given place, and because its evolutionary strategy was to form large flocks to evade predators, the birds always appeared in great quantity. There was no way to gauge their decline, and, just as important, no way to connect individual acts of groups of hunters to any particular increment of depletion.

The need for a critical mass of passenger pigeons to carry on the species made the problem a "lumpy" or indivisible one; once exploitation of the resource crossed a critical threshold, the

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21. *See, e.g.,* Taylor & Ward, *supra* note 6, at 353 (describing and depicting possible paths for such a collapse).

22. *See, e.g., id.* ("Ecological systems such as lakes, rivers, the atmosphere, fisheries and so on can normally be exploited up to some critical level while largely maintaining their integrity and retaining much of their use value. If exploitation rates go beyond that critical level, use value falls catastrophically.").

23. Carol M. Rose, *Evolution of Property Rights*, 2 THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 93, 96 (Peter Newman, ed., 1998).

24. *See, e.g.,* RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 11–14 (2004) (discussing "all or nothing" threshold effects in environmental contexts and citing these examples).

25. *See generally*, JOEL GREENBERG, A FEATHERED RIVER ACROSS THE SKY: THE PASSENGER PIGEON'S FLIGHT TO EXTINCTION (2014).

26. *See id.* at xii.

population collapsed irretrievably. The problem was one of low visibility. This was true in both of the senses to be explored in this Essay: the shape of the collective action problem was opaque, as was the way that individual acts aggregated to impact the outcome. There was no real-time feedback as hunting proceeded, and hence no way to calibrate the intensity of harvesting to align with sustainable levels. There was also no incentive to do so. Without any way to coordinate with the other hunters, any individual's acts of forbearance would be meaningless; someone else would take up the slack. Better visibility could have made it possible to see, and pursue, a cooperative solution.

It is easy to chalk up the fate of the passenger pigeon to a tragedy of the commons, and to blame the birds' extinction on the lack of property rights or inadequate government regulation.[27] But this misses the fact that a cooperative solution might have become possible if only the participants could have seen more clearly what was going on. The ability to monitor and trace the impact of individual actions, always important in contexts involving collective goods or commonly owned resources,[28] takes on special significance where indivisibilities are concerned. The reason relates to the ways in which the presence of indivisibilities alters the structure of a collective action problem and changes the prospects for cooperative action. The next section explains.

B. Beyond the Tragedy of the Commons

The standard tragedy of the commons story predicts that people with access to common pool resources will act in a manner that is individually rational but socially harmful—they will "defect" by doing the selfish thing, rather than "cooperate." But that result depends on a set of quite specific assumptions, as becomes clear in examining the tragedy's two-person structural equivalent—the single-shot Prisoners' Dilemma (PD).[29]

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27. *See* OSTROM, *supra* note 8, at 8–14 (1990) (critiquing commentators who argue that either "Leviathan" or privatization represent "the only way" to solve a commons dilemma).

28. *Id.* at 45, 94–100 (discussing the importance of monitoring in common resource settings); Steven J. Karau & Kipling D. Williams, *Social Loafing: A Meta-Analytic Review and Theoretical Integration*, J. PERSON. & SOC. PSYCH. 681, 683, 696, 700 (1993) (assessing studies examining how the ability to identify and evaluate individual contributions (including self-evaluation) can reduce "loafing" on group tasks).

29. Scholars have often noted the structural equivalence between the Prisoners' Dilemma and the tragedy of the commons. *See* Rose *supra* note 11, at 564 (crediting Russell Hardin with the original insight and noting that it "is now a widely-accepted view") (citing Russell Hardin, *Collective Action as an Agreeable n-Prisoners' Dilemma*, 16 BEHAVIORAL SCIENCE 472 (1971)); *see also* OSTROM, *supra* note 8, at 3–5; BAIRD ET AL., *supra* note 2, at 34.

The titular PD setup is one in which two prisoners, interrogated separately, each have the choice to cooperate (with each other) by remaining silent, or defect (by confessing).[30] If both confess, they both receive moderate sentences, say three years. If they both stay silent, they both receive short sentences, say one year. But if one confesses and the other stays silent, the confessor goes free and the silent one goes to prison for a long time, say seven years. Focusing solely on the prison consequences, each prisoner would rationally choose to confess no matter what the other person does. If the other person will stay silent, it is better to confess (going free versus one year), and if the other person will confess, it is still better to confess (three years versus seven).

Under these conditions, and assuming no repeat play, binding contracts, social norms, or extra-legal consequences, there is a single equilibrium outcome: mutual defection.[31] The same analysis holds if we translate the story into a resource context where defecting involves overharvesting or polluting, and cooperating involves refraining from these actions—so long as one always does better defecting regardless of what the other players in the story do. Public goods games in which contributions are multiplied and distributed evenly to the players epitomize this structure; as long as the "multiplier" is smaller than the number of players, each player does best by defecting and contributing nothing, regardless of what anyone else does.[32] However, researchers have found that few situations, inside or outside the lab, match the payoff structure specified by the PD game.[33] As a result, the analyses that flow from it are unlikely to track real-world resource dilemmas.[34] There are

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30. *See, e.g.,* Lee Anne Fennell and Richard H. McAdams, *Inversion Aversion*, 86 U. CHI. L. REV. 797, 807–08 (2019) (presenting and describing a standard PD game matrix with the payoff structure detailed here).

31. *See, e.g.,* Richard H. McAdams, *Beyond the Prisoners' Dilemma Coordination, Game Theory, and Law*, 82 S. CAL. L. REV. 212 (2009). The mutual defection solution is a Nash equilibrium, named after John Nash, which describes a set of strategies in which no player can do better given the strategies of the other players. *See id.* at 212 n.9 (citing BAIRD ET AL., *supra* note 2, at 310).

32. *See* Pamela Oliver et al., *A Theory of the Critical Mass. I. Interdependence, Group Heterogeneity, and the Production of Collective Action,* 91 AM. J. SOC. 522, 540 (1985) (explaining that under such conditions, "predictions about others' behavior are irrelevant, for contributions are irrational no matter what other people do"). If, on the other hand, the multiplier is *larger* than the number of players, there is a different dominant strategy: everyone will contribute everything they have, regardless of what anyone else does. *See id*. at 533–34 (explaining that when production functions are linear, the slope determines which of two patterns will prevail: "[e]veryone will contribute either everything possible or nothing").

33. *See, e.g.,* McAdams, *supra* note 31; Glenn W. Harrison & Jack Hirshleifer, *An Experimental Evaluation of Weakest Link/Best Shot Models of Public Goods*, 97 J. POL. ECON. 201, 201–02 (1989).

34. *See, e.g.,* Fennell & McAdams, *supra* note 30, at 807–10 (discussing and citing

many reasons for this divergence, but the one of interest here is the indivisibility of the good or goal, which keeps any party from enjoying a positive payoff unless enough people cooperate.

When indivisibilities are present, the game differs markedly from the one suggested by the PD or tragedy of the commons template. Two other game theory templates are especially relevant, both evocatively named: the Stag Hunt (also called the Assurance Game), and Chicken (also called the Hawk-Dove Game).[35] The Stag Hunt story, based on a passage from Rousseau, involves two hunters who must choose whether to cooperate with each other to bring down a deer or defect by hunting rabbits individually.[36] The deer is a much better food source for the pair than the rabbits they can hunt on their own, but it is impossible for either of them to bag it alone.[37] A deer kill is an indivisible event; it is not helpful to halfway hunt a deer.[38] As a result, neither hunter wants to go deer hunting on her own; doing so would leave her hungry at the end of a wasted day. If the other hunter is not going to help bag a deer, rabbit hunting is her best bet. Here, the two hunters do best if they can be sure both will cooperate; with that assurance in place, they are not tempted (as they are in the PD game) to defect.[39]

This game setup illustrates the effects of indivisibility, but it diverges from most environmental or resource dilemmas in other respects. In the two-person Stag Hunt game, each of the two players is necessary to bring down the lumpy ungulate, and the payoffs are symmetric. In most real-world situations, however, some degree of cooperation is needed to achieve an indivisible goal, but usually unanimous cooperation is not essential, and payoffs vary because

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literature on this point); OSTROM, *supra* note 8, at 33–30 (criticizing the assumption that all collective action problems are Prisoners' Dilemmas); McAdams, *supra* note 31 (describing widespread overuse and misuse of the Prisoners' Dilemma framework by legal academics).

35. *See, e.g.,* Taylor & Ward, *supra* note 6; McAdams, *supra* note 31. There are minor variations, not relevant here, between certain versions of the Assurance Game and the Stag Hunt. *See* Daphna Lewinsohn-Zamir, *Consumer Preferences, Citizen Preferences, and the Provision of Public Goods*, 108 YALE L.J. 377, 392 nn.39–40 (1998); *see also* Amartya K. Sen, *Isolation, Assurance and the Social Rate of Discount*, 81 Q.J. ECON. 112, 114–15 (1967) (formulating the "Assurance Problem").

36. *See* EDNA ULLMANN-MARGALIT, THE EMERGENCE OF NORMS 121 n.15 (1977) (quoting JEAN JACQUES ROUSSEAU, ON THE ORIGIN OF INEQUALITY 349 (G.D.H. Cole trans. 1952)).

37. *See id.* at 121 (quoting DAVID K. LEWIS, CONVENTION: A PHILOSOPHICAL STUDY 7 (1969).

38. *See* Kristen Hawkes, *Sharing and Collective Action*, in EVOLUTIONARY ECOLOGY AND HUMAN BEHAVIOR 269, 288 (Eric Alden Smith & Bruce Winterhalder, eds., 1992) ("Hunters cannot bring down part of a giraffe."); LEWIS, *supra* note 37, at 7 ("[I]f even one of us deserts the stag hunt to catch a rabbit, the stag will get away; so the other stag hunters will not eat unless they desert too.").

39. *See, e.g.,* McAdams, *supra* note 31, at 221.

different people need not all contribute the same amount of money, materials, or effort. In these cases, a second strategic interaction comes into play: Chicken.[40]

Chicken is named for a hazardous driving game in which two foolhardy motorists are set on a head-on collision course and one (or both) must swerve to avoid catastrophe.[41] A player can lose the game by swerving, but both players lose far worse by crashing. Each player would rather drive straight and win out over the swerver, yet she cannot safely do so unless she expects her opponent to swerve.[42] A crash is an indivisible event, a bad shared by all who experience it, and everyone has an interest in keeping it from happening. Dealmaking often features this dynamic—the worst outcome is the total loss of the surplus from completing the deal (a kind of crash), but each party wants more of that surplus.[43]

Putting the two games together, we can see that often there is a Chicken game in progress about who will cooperate to bring down the metaphorical stag in the story—the indivisible good that can be enjoyed only with enough cooperation.[44] Everyone loses if the stag is not brought down, but the ones who lose the most are those who chose the cooperative strategy only to go hungry. Everyone wins if the stag is brought down (assuming that sharing is required, or that it's impossible to exclude people from the spoils), but those who win the most are those who did not contribute anything to its demise (assuming unanimous participation is not required to bag the stag).

Indivisibilities change the collective action problem from one in which the dominant strategy is to defect, no matter what anyone else does, to one in which one's own best strategy depends crucially on what one expects others to do. In game theory jargon, there are *multiple equilibria*:[45] players may cooperate and achieve the indivisible good, or things may fall apart entirely due to miscalculations, lapses in communication, or strategic behavior.

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40. *See, e.g.,* Taylor & Ward, *supra* note 6.

41. *See, e.g.,* BAIRD ET AL., *supra* note 2, at 44.

42. *See id.*

43. *See id.* at 43–44.

44. *See* Hawkes, *supra* note 38, at 289 ("If there are more potential participants than the minimum required, however, games of Chicken arise over who shall complete the working group."); Taylor & Ward, *supra* note 6, at 357–58 (describing how Chicken and Assurance games interact in a fishing scenario where not everyone's cooperation is required); Hugh Ward, *Three Men in a Boat, Two Must Row: An Analysis of a Three-Person Chicken Pregame*, J. CONFLICT RES. 371 (1990) (discussing Chicken pre-games in which parties vie to precommit to not contribute to a lumpy good that does not require everyone's contributions).

45. *See* McAdams, *supra* note 31, at 212.

Recognizing that *expectations* determine actions and outcomes shifts the emphasis to how people form expectations about how others will act.[46]

III. STRUCTURE AND STRATEGY

Indivisibility is a game changer. Defecting is no longer the single dominant strategy; cooperation may be rational depending on what others will do. But players faced with indivisible resource problems may still act as if they are trapped in a tragedy of the commons.[47] A core problem is the inability to observe or predict the choices that other people will make.[48] More foundationally, however, the terms of the game itself may be unclear. In this Part, I examine the structural features of indivisible resource problems and show how these features—and differences among them—influence the strategies of the players.

A. Anatomy of a Collective Action Problem

The Stag Hunt and Chicken games both provide an intuitive sense of why indivisibility matters to cooperation: everyone stands to lose unless enough players choose the cooperative strategy. Real-world resource dilemmas are, of course, far more complex than these simple two-player games. We can further refine our understanding of collective action problems involving indivisibilities by focusing on three defining features: production functions, participation requirements, and payoffs.[49]

1. Production Functions

A production function is simply a way of capturing the relationship between inputs and outcomes in producing a particular good or bad.[50] Suppose we want to create a migration pathway. What happens to the value of the pathway as each incremental segment is added? If the pathway is only useful when it is complete

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46. *See* THOMAS C. SCHELLING, THE STRATEGY OF CONFLICT 54–58 (1960); Robert B. Ahdieh, *The Visible Hand: Coordination Functions of the Regulatory State*, 95 MINN. L. REV. 578, 618–19 (2010).

47. *See* HARDIN, *supra* note 5, at 57–59 (discussing several reasons why the universal defection outcome associated with the PD might occur even when step goods are involved).

48. *See id.* at 58–59 (describing the situation in which "members of a group must choose when they have deficient knowledge of how others are choosing").

49. *See* FENNELL, *supra* note 6, at 47–49.

50. *See* Oliver et al., *supra* note 32 (describing and depicting various production functions for public goods).

(perhaps because it is essential that the animals using it be able to move between habitat patches located at each end),[51] then *nothing* happens to the value of the pathway as each segment is added, until the final piece is put in place. Graphically, value follows a flat line until it suddenly jumps up in a large single step when the last segment is added and the path is completed.[52]

By contrast, a linear production function provides proportionate benefits as inputs are contributed. Think of a parking meter where adding each coin buys a proportionately calibrated unit of parking time, or a soup kitchen where each marginal ladle-full delivers a roughly equivalent nutritional benefit to an additional person. It is possible to quibble with all of these examples: even a partial wildlife corridor might provide some habitat benefits, people often need to park for discrete chunks of time, and soup production usually involves economies of scale. More generally, few if any goods involve a literal single step of value or exhibit a fully linear production function. Many production functions follow a more complex path that combines steps with slopes or contains regions of increasing or decreasing returns—or some of each.[53]

It may also be unclear what production function best describes observed phenomena. For example, we may be uncertain whether a particular resource is more valuable when consolidated into a single large chunk (which would suggest increasing returns to scale) or divided into smaller, scattered segments (which would suggest the opposite).[54] In environmental science, the famous SLOSS ("single large or several small") debate took up just this question in the habitat context, with largely inconclusive results.[55] Interconnectedness among organisms and habitats can make fragmentation harmful and consolidation valuable,[56] but smaller, well-separated areas can provide greater diversification of risk

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51. *See, e.g.,* Lynne Gilbert-Norton et al., *A Meta-Analytic Review of Corridor Effectiveness*, 24 CONSERV. BIO. 660, 667 (2010).

52. The "last segment" might be any of the segments along the path, if each is essential.

53. *See, e.g.,* HARDIN, *supra* note 5, at 57–59; Oliver et al., *supra* note 32, at 525–28.

54. Similar questions crop up in land assembly contexts, where holdout dynamics can make it difficult or impossible to tell whether component parcels are more highly valued separately in their existing uses or aggregated for a new use. *See, e.g.,* FENNELL, *supra* note 6, at 36–37.

55. *See, e.g.,* ENRIC SALA, THE NATURE OF NATURE: WHY WE NEED THE WILD 154 (2020); HILTY ET AL., *supra* note 18, at 60.

56. On the costs of fragmentation, *see*, *e.g.*, SALA, *supra* note 55, at 153; HILTY ET AL., *supra* note 18, at 55–82; Nick M. Haddad et al., *Habitat Fragmentation and Its Lasting Impact on Earth's Ecosystems*, 1 SCI. ADV. (Mar. 20, 2015), https://advances.sciencemag.org/content/1/2/e1500052.full.

and may be less costly to add in already developed areas.[57] Still, we know that for many environmental goods, the whole is greater than the sum of the parts, and relatively small changes, such as those that break up minimum sustainable populations, can cause disproportionate harm.[58]

A related problem is that even if we know that crossing a critical line will make a large difference, it may be unclear what state of the world that line corresponds to, or where our current state of affairs stands relative to it. For example, we may be uncertain about the maximum sustainable yield for a given fishery, and we may even lack good data about actual fishing levels. In other words, we might know that there is a cliff effect in a particular resource context, but have no idea whether we are about to go over the cliff. Projections that extrapolate from existing or historical data may present a false picture where significant nonlinearities are present. As a result, models are constantly contested and revised, and an accurate story may emerge only after much damage has already occurred.[59]

Despite these caveats, the distinction between incremental and all-or-nothing effects remains structurally significant. The lumpier or more indivisible a given good or goal is, the less possible it is for anyone to enjoy its benefits until the critical threshold is reached. This does not mean that people will always cooperate to produce the good, only that they are not categorically better off choosing not to do so. The good may be provided or preserved in its entirety, or it may be lost altogether. Which result will prevail? The answer depends in part on whose cooperation is necessary to the outcome, which brings us to participation requirements.

2. Participation Requirements

Participation requirements tell us who, exactly, must agree or contribute in order for a particular goal to be reached.[60] Where a

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57. *See, e.g.,* SALA, *supra* note 55, at 154 (observing that "[s]mall protected areas may be the only practical tool in regions heavily populated by humans"); HILTY ET AL., *supra* note 18, at 146–63 (discussing potential drawbacks to corridors, including economic costs and "edge effects" from long and narrow pathways).

58. Similarly, protecting a resource like a fishery incompletely may do very little good compared with providing full protection. *See*, *e.g.,* SALA, *supra* note 55, at 150 ("In protected areas that allow some fishing, the fish biomass does not even double. But in fully protected areas, the total biomass of fish is, on average, six times greater than in unprotected areas nearby, and sharks are 15 times more abundant.").

59. *See, e.g.,* Gordon, *supra* note 8, at 126–28 (discussing shifts in views about the state of fisheries); Thompson, *supra* note 1, at 258–59 (noting the significance of "scientific uncertainty" about the state of resources such as fisheries, and the tendency toward "tremendous wishful thinking" and overly optimistic construal of ambiguity).

60. Although the discussion here focuses on the cooperation of individuals, many

physical input like real estate is necessary to produce the good, as in the case of a highway or wildlife corridor, cooperation must come from those who own or control the land lying along the path. If there is only one viable path, then every one of the people who owns land along it must cooperate, unless there is a coercive process like eminent domain to override their failure to cooperate. Other situations have more flexible participation requirements—often, merely "enough" people must cooperate, not any specific set of actors. For example, if vaccination of 90% of a population against a disease produces herd immunity sufficient to protect the community as a whole, then most, but not all, people must cooperate to produce that good.[61]

For common pool resources like the passenger pigeon, participation requirements are tricky: forbearance by some people may be met by intensified hunting from others. Everyone who is in a position to hunt intensively can affect the outcome. By contrast, participation requirements are quite open-ended when a monetary goal is involved because the necessary threshold can be met by any one person or combination of persons with the necessary funds. The indivisibility of the good in question and the stringency of the participation requirements tell us a great deal about who needs to cooperate, but these factors do not tell us whether that cooperation will occur. For that, we need to examine payoffs.

3. Payoffs

The signature feature of an indivisible good is that no one can enjoy any increment of the good until it is supplied in full (or in some minimally useful chunk). As a result, payoffs do not rise above zero for *anyone* unless enough people cooperate (per the participation requirements) to supply the good (or avoid the bad). This foundationally changes the dynamics of the situation and keeps noncooperation from being the dominant strategy under all circumstances. Failing to cooperate *could* win one a higher payoff (if it is possible to free ride on others or extract more surplus), and cooperating *could* reduce one's payoff below the initial baseline (wasting effort futilely hunting a stag alone), but cooperating might

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resource problems will require the cooperation of larger entities like firms or governments. We might think of these situations as involving an antecedent collective action problem among stakeholders or constituents to influence the incentives of the entities in question.

61. *See* THOMAS C. SCHELLING, MICROMOTIVES AND MACROBEHAVIOR 222–23 (revised ed. 2006)

also make the critical difference between being able to enjoy a large indivisible good (or dodge a catastrophe) and losing out on that opportunity altogether.

Several features determine the specifics of a given payoff structure. If not everyone's participation is essential to supply the good, is it possible to exclude noncontributors from the benefits? If the indivisible good is supplied, are the gains distributed symmetrically (as in the Stag Hunt) or asymmetrically (as in Chicken)? If the threshold is not reached, can those who have contributed get their contributions back, or are those amounts simply forfeited? If the threshold is exceeded, who (if anyone) gets the excess? Finally, once people contribute to the good in question, can their contributions be "raided" or eroded by noncontributors? For example, if some fishers curtail their fishing to improve sustainability, can a noncooperating subset of fishers intensify their own efforts to nullify (and profit from) those efforts?

Any factor that influences how and whether contributions to the good can be wasted, enjoyed, eroded, raided, or undone by other actors can alter the expected payoff from cooperating. The next sections elaborate on these and other aspects of a resource game's structure. The prospects for cooperation depend on one's ability to see this structure and predict the moves of others within it.

B. A Lumpy Public Goods Game

Research has investigated contribution decisions in stylized experimental settings where the rules of the game are made explicit. Of particular interest for our discussion are games in which players must choose whether or not to contribute to a central fund, where meeting a particular threshold of contributions will trigger the payment of a large bonus to be distributed among all the players. This setup replicates a lumpy public good, like finding a cure for a disease or saving a species. The good has an all-or-nothing quality; it generates benefits for everyone if it is provided, and no benefits for anyone if it is not.

A standard game might involve seven players who are each given $5 that they can contribute (entirely) or keep.[62] If at least five contribute, a bonus of $70 pays out to the group in equal shares ($10 each). But if the threshold is not reached, the contributors go home

62. *See, e.g.,* Robyn M. Dawes et al., *Organizing Groups for Collective Action*, 80 AM. POL. SCI. REV. 1171 (1986) (presenting results of similarly structured games); Christopher C. Fennell & Lee Anne Fennell, *Fear and Greed in Tax Policy: A Qualitative Research Agenda*, 13 WASH. U. J. L. & POL'Y 75, 93–100 (2003) (discussing and analyzing games involving step-level goods).

empty-handed. Likewise, if the contribution is exceeded, no one gets more than their share of the bonus. Notably, players need not engage in guesswork about production functions, participation requirements, or payoffs. Unlike real-world resource dilemmas, where the shape of the problem is often opaque, the experimental game's structure is expressly conveyed in the instructions. This transparency immediately resolves one set of visibility problems, but it leaves players uncertain about the strategies that other players will pursue.

What do we expect will happen? No one can enjoy any payoffs unless the threshold is reached, so there is some motive to contribute. At the same time, there is a risk of losing one's money if the threshold is not reached, as well as an opportunity to gain even more by hanging onto one's money if the threshold will be reached in any case. In an experiment similar to this, nearly two-thirds of the players chose to contribute under such conditions.[63] Is it possible to do better? One experimental intervention involved a money-back guarantee similar to the funding one might find on a platform like Kickstarter: if the threshold is not reached, everyone gets their money back. Interestingly, this did not seem to help significantly.[64] On the one hand, it was reassuring to the players that they would not lose their money if the threshold was not reached. But on the other hand, they could also predict that the money-back feature would reassure others, making it more likely their own contribution would not be needed after all.[65] Free riding remained a problem.

More effective was an intervention that effectively kept noncontributors from gaining anything by defecting.[66] It was easy to accomplish this result in the experimental setting by specifying that no one could leave with more than $10 (the share of the bonus that each player would receive if the threshold was reached). As long as the threshold was reached, everyone went home with an identical payoff, whether they chose to contribute or not.

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63. *See* Dawes et al., *supra* note 62, at 1176–78 & tbl. 2.

64. *See id.* at 1175–78. There are, however, some reports of success with this method. *See id.* at 1172; *see also* Ian Ayres, *Voluntary Taxation and Beyond: The Promise of Social-Contracting Voting Mechanisms*, 19 AM. L. & ECON. REV. 1, 4–5 (2017) (discussing mixed results of laboratory and field experiments on "provision point mechanisms" that refund contributions if the target is not met). For further discussion of this approach and variations on it, *see generally*, Julia Y. Lee, *Gaining Assurances*, 2012 WIS. L. REV. 1137 (2012). For an especially interesting field experiment that involved soliciting a threshold level of contributions to preserve habitat for the Bobolink, a grassland-nesting songbird, *see* Stephen K. Swallow et al., *The Bobolink Project: Selling Public Goods from Ecosystem Services Using Provision Point Mechanisms*, 143 ECOLOGICAL ECON. 236 (2018) (reporting results of using various provision point mechanisms, with money-back guarantees, to fund contracts with farmers who would alter their haying practices to preserve nesting areas).

65. *See* Dawes et al., *supra* note 62, at 1174.

66. *Id.* at 1175, 1183.

Yet in many real-world contexts, there is no way to meaningfully offer refunds or keep noncontributors from free riding. Efforts expended on conservation measures generally cannot be clawed back if those efforts fail; if they succeed, the results will be enjoyed or shared by noncontributors as well as contributors.

What alternatives exist? One answer is to inculcate norms of cooperation, so that people suffer shame and social stigma if they do not cooperate, and enjoy peer approval or esteem if they do cooperate.[67] This is another way of rewarding cooperation and punishing defection, only using non-monetary payoffs. We will return to this possibility, and its connections to visibility, below.[68] But first it is worth emphasizing a way in which self-interest alone can solve the free-rider problem: if people are convinced that their own contribution is essential to the outcome. When goods are indivisible and everyone stands to benefit from their provision—or suffer from their absence—it can be rational (in a narrow self-interested sense) for people to contribute.[69] The next section explains.

C. The Importance of Being Essential

When goods are indivisible, each piece of the whole matters. That can generate holdout problems, because each person who controls an essential element has an effective veto. However, participation requirements vary: often, the good may be supplied (or the bad avoided), even if some people do not cooperate or contribute. That eases the holdout problem, but introduces a second problem: noncooperators can improve their payoff relative to cooperators by free riding, if enough cooperators exist to provide the good.

A third problem, a sense of futility, can block progress whenever a high threshold must be reached in order to supply a good or avoid a bad. People may refrain from cooperating or contributing because they feel their efforts can make no difference against such a vast problem. Benjamin Hale describes the disabling sense of "causal impotence" that can impede progress in the climate change

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67. *See, e.g.,* Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338 (1997).

68. *See infra* Part IV.D.

69. *See, e.g.,* Glenn W. Harrison & Jack Hirshleifer, *An Experimental Analysis of Weakest Link/Best Shot Models of Public Goods*, 97 J. POLIT. ECON. 201, 203 (1989) ("In desperate circumstances in which each person must do his or her duty (and even more) if the community is to survive, what appears to be self-sacrificing behavior may actually be selfishly optimal in swinging the balance between community viability and social collapse.").

context,[70] and other scholars have noted how "drop in the bucket" perceptions can deter action and dissipate personal responsibility.[71] As Arden Rowell and Kenworthey Bilz explain, people may distance themselves from environmental problems by emphasizing the insignificance of their own marginal impact: "'It's not like me riding my bike to work is going to magically fix local air quality'"[72]

All three of these problems (holding out, free riding, and futility) relate to the significance of being essential to producing a particular good, whether that means putting together a physical assembly like a wildlife corridor or highway, reaching a goal like curing a disease or winning an election, or avoiding a catastrophic result like species collapse. Where a good has a lumpy all-or-nothing character, contributions toward producing it can be futile, critical, or superfluous.[73] If one's payoffs stem only from the provision of the good (or lack thereof), and not also from intrinsic or social rewards from cooperating (or punishments for not cooperating), then one would rationally contribute one's own efforts or resources when three conditions are met: (1) one's contribution will be critical to the outcome; (2) one will reap enough from the provision of the good to more than cover the cost of contributing; and (3) it is not possible to improve one's payoff through strategic behavior.

In a simple two-person Stag Hunt game, these conditions are relatively easy to meet. The participation of either party makes the other party's participation critical to the outcome, and the payoffs assume that the spoils will be shared in a way that makes that critical participation worthwhile. Futility—hunting stag alone—is the only risk in the story, and it is entirely eliminated if the (only) other player can be counted on to hunt stag. The cooperative solution is assured if each party can see that the other will cooperate. In other words, visibility alone can do the trick. This

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70. Benjamin Hale, *Nonrenewable Resources and the Inevitability of Outcomes*, 94 THE MONIST 369, 381–82 (2011).

71. *See, e.g.,* Daniel Bartels & Russell C. Burnett, *A Group Construal Account of Drop-in-the-Bucket Thinking in Policy Preference and Moral Judgment*, 47 J. EXPERIMENTAL SOC. PSYCH. 50, 50–51 (2011) (discussing Peter Unger's notion of "futility thinking" and connecting it to "drop-in-the-bucket thinking" in which a larger denominator makes a given saving of lives or resources seem less compelling)*; see also* ULLMANN MARGALIT, *supra* note 36, at 28–29 (discussing how the "condition of individual insignificance" can produce higher levels of defection).

72. ROWELL & BILZ, *supra* note 3, at 34.

73. *See* Amnon Rapoport, *Provision of Public Goods and the MCS Experimental Paradigm*, 79 AM. POL. SCI. REV. 148, 149–51 (1985) (discussing payoff calculations that depend on whether one's will be "critical" rather than wasted or unnecessary); Dawes et al., *supra* note 62, at 1178–81 (examining probabilities of being "futile, critical, and redundant"); *see also* Fennell & Fennell, *supra* note 62, at 93–96.

outcome is also stable: neither party will do better, defecting so long as the other cooperates. In many real-world settings, however, at least one of these conditions fails.

Futility often presents a large threat in many-player contexts. Convincing people that their efforts are important—that they will add up to something—can, counterintuitively, be approached by asking for very little. The 1938 "March of Dimes" campaign to eradicate polio took just this tack, soliciting a contribution increment that was both clear and broadly attainable—one dime.[74] Research on charitable contributions has found that communicating messages like "even a penny will help" can induce more people to contribute, at least in face-to-face solicitation settings—an effect known as "legitimizing paltry contributions."[75] In the context of an indivisible good, the message is only conditionally true; a penny or a dime will not help at all, unless enough other people contribute as well. Perhaps such solicitations send the message that the solicitors are confident about being able to assemble a large enough chunk of contributions to supply a large indivisible good like curing a disease.

Where not everyone's participation is essential, the prospect of free riding arises—assuming the good is one from which noncontributors cannot be excluded. Here visibility might actually seem to backfire if it enables people to see when enough others have contributed and they can safely free ride. If everyone tries to sit back and watch, making contributions visible might mean that there are no contributions to see. Yet keeping contributions hidden leaves people with no guidance about the best strategy to pursue, other than their own assumptions about what others are doing—assumptions that are prone to systematic distortions.[76] Making choices in the dark, people may be paralyzed by a sense of futility, tempted by the prospect of free riding on others, or fearful

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74. *See Origin Of Our Name,* MARCH OF DIMES, https://www.marchofdimes.org/mission/eddie-cantor-and-the-origin-of-the-march-of-dimes.aspx.

75. *See* Robert B. Cialdini & David A. Schroeder, *Increasing Compliance by Legitimizing Paltry Contributions: When Even a Penny Helps*, 34 J. PERSONALITY & SOC. PSYCH. 599 (1976); *see also* Indranil Goswami & Oleg Urminsky, *When Should the Ask be a Nudge? The Effect of Default Amounts on Charitable Donations*, 59 J. MKTG. RESEARCH 829 (2016) (presenting results indicating that low defaults increase contribution rates, but also cause people to scale back their contributions to the default amount).

76. The psychological study of "social projection" has identified a number of biases, including "the false consensus effect" (assuming that one's own behaviors or beliefs are more prevalent than they actually are) and the "uniqueness bias" (underestimating how many others will act as commendably as oneself when engaged in good behaviors, or overestimating how many others will act as poorly as oneself when engaged in bad behaviors). *See, e.g.,* Benoit Monin & Michael Norton, *Perceptions of a Fluid Consensus: Uniqueness Bias, False Consensus, False Polarization, and Pluralistic Ignorance in a Water Conservation Crisis*, 29 PERSONALITY AND SOC. PSYCH. BULL. 559 (2003). *See also* McAdams, *supra* note 67, at 400–05 (discussing problems communicating a consensus and the prevalence of "false consensus" effects).

of others free riding on them. In the absence of a regulatory approach that *requires* participation, what alternatives remain?

One possibility is to construct indivisible goals that effectively make everyone's cooperation essential (as it is in the two-person Stag Hunt). Samuel Popkin's analysis of political entrepreneurship in peasant movements offers useful insight on this point: "if a large overall goal can be broken into many small independent pieces, all of which are necessary, the free-rider problem can be overcome, for if each person has a monopoly on a necessary factor for the final goal, all contributions are essential."[77] This observation is consistent with research findings on dilemmas that have a "weakest link" structure in which any failure to contribute is fatal to the goal.[78]

Returning to the lumpy public goods game above, suppose that *every* player had to contribute their $5 in order for the threshold to be met for receiving the bonus. This makes the game easier to solve in one way, because there is no opportunity for anyone to free ride, but it also makes it seem riskier to contribute if people are uncertain that others will also contribute. The prospects for cooperation remain relatively high, however, because everyone is in symmetrical positions with respect to contributions and payoffs; all that is needed is mutual assurance that all will contribute.

A different dynamic occurs in many land assembly contexts. Here, the fact that each landowner's parcel is essential to a planned project (a highway, say, or a major redevelopment effort) presents a holdout problem that can thwart efforts to put the pieces together through private sales. Such holdout problems form a primary rationale for eminent domain, which overrides the need to assemble cooperation from all of the landowners. Far from facilitating cooperation, knowledge of one's own centrality to the overall scheme can prompt strategic behavior in attempting to gain more of the assembly surplus. This strategizing can raise costs or even sink the assembly altogether. Hence the observation that private developers, who are not subject to the same transparency requirements as governments, might be in a better position to assemble land in some contexts because they can rely on secrecy and proxy purchasers to obscure their assembly plans.[79]

Being essential, and knowing it, goes from spurring cooperation in a public goods game to impeding it in the land assembly case.

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77. SAMUEL L. POPKIN, THE RATIONAL PEASANT: THE POLITICAL ECONOMY OF RURAL SOCIETY IN VIETNAM 257 (1979).

78. *See, e.g.,* Harrison & Hirshleifer, *supra* note 33; Hawkes, *supra* note 38, at 288–89.

79. *See* Daniel B. Kelly, *The "Public Use" Requirement in Eminent Domain Law: A Rationale Based on Secret Purchases and Private Influence*, 92 CORNELL L. REV. 1, 20–24 (2006) (discussing the use of secret buying agents by Harvard and Disney to assemble land).

Why? The answer relates to whether a player can do even better by *threatening* not to cooperate. This possibility did not exist in the stylized Stag Hunt, because cooperation involved symmetrical and essential contributions and both players stood to get equal payoffs. By contrast, Chicken presents the possibility that, in achieving an indivisible good (avoiding a crash) one party wins more than the other—facts that much more closely resemble real-world resource dilemmas in which different parties stand to gain or lose different amounts from realizing an indivisible goal.[80]

Even in Chicken, everyone finds it in their own interest to cooperate if necessary, to avoid the crash outcome. But the game is a dangerous one because each party wants to glean more surplus along the way. Parties miscalculate and wind up destroying deals that would be valuable for all concerned. Even though visibility seems like part of the problem, it is the knowledge of one's own centrality to the goal coupled with *misreading* what the other party will do that leads to tragedy. Refusal to swerve in Chicken is always based on a prediction that the other party *will* swerve. Where it is clear that this is not the case, swerving becomes the best strategy. This is why one party's unilateral precommitment to not swerving (by tearing out the steering wheel, for example) can ensure a win while precluding a tragic crash—but only if the other party sees it! [81]

In short, visibility can improve predictions about the behavior of others, as well as illuminate the structure of the game that is underway. The next Part explains how enhanced visibility can promote cooperative rather than destructive equilibria.

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80. A related possibility is that there might be two (or more) alternative goals that the parties could pursue cooperatively, either of which would bring gains to both of them, but in different proportions. This payoff structure tracks a standard game dubbed the Battle of the Sexes (BOS) in which both members of a couple will gain by attending an event together but one will gain more from attending Event A and the other will gain more from attending Event B. *See* BAIRD ET AL., *supra* note 2, at 41–42. Similarly, the hunters in our story might coordinate on hunting stag or on hunting bison, with one player benefiting more from the former, and the other player benefiting more from the latter. Hence, we might see a strategic interaction over *what* to cooperatively hunt embedded in the decision to cooperatively hunt in the first place (rather than just hunt rabbits alone). *Cf.* RICHARD H. MCADAMS, THE EXPRESSIVE POWERS OF LAW: THEORIES AND LIMITS 69 (2015) (discussing instances in which a BOS is embedded within a PD game). Environmental analogues are plentiful; progress typically requires cooperation, but that cooperation could take a variety of different forms with different distributive consequences.

81. *See* HERMAN KAHN, ON ESCALATION: METAPHORS AND SCENARIOS 11 (1965) (describing a player's strategy of throwing the steering wheel out the window and observing that "[i]f his opponent is watching, he has won. If his opponent is not watching, he has a problem . . . ."); *cf.* SCHELLING, *supra* note 46, at 24 ("if the buyer can accept an irrevocable *commitment*, in a way that is unambiguously visible to the seller, he can squeeze the range of indeterminacy down to the point most favorable to him.").

IV. ENHANCING VISIBILITY

Because indivisible goods have an all-or-nothing structure, there can often be a razor's edge dynamic in which things could go either of two very different directions—complete success or total failure. How can visibility tip equilibria in the direction of conservation rather than devastation, viability rather than extinction, sustainability rather than catastrophe? The good news is that a problem's indivisible structure can help catalyze cooperation. The fact that achieving the cooperative solution is in the interest of all concerned makes it possible for policies to work with, rather than against, self-interest. The bad news is that indivisible environmental problems often suffer from low visibility along a number of dimensions. Not only is their structure often opaque, the strategies undertaken by other players may be impossible to observe or predict.

These two shortfalls in visibility, although conceptually distinct, are empirically entwined in many environmental settings. The payoffs that will flow from particular combinations of choices—crucial to understanding the structure of the game—will often be contested and unclear. Because human actions and resource outcomes are often highly attenuated and temporally lagged, the way one's own choices combine with those of others will generally be unknown. For similar reasons, it may be impossible to infer what strategies others are pursuing from the current state of a given resource system, or to guess what choices others are likely to make next.

Both sorts of visibility challenges—seeing the problem's structure and seeing the strategies of others—are exacerbated by a predicate problem: recognizing that a problem worth solving exists in the first place. Many environmental threats are hard to visualize because they depend on complex interactions that are not directly observable, that are diffuse across time and space, and that often have little immediate effect on human beings.[82] It is impossible to apprehend the structure of a problem or to predict how others will respond to it without first recognizing it *as* a

82. *See, e.g.*, ROWELL & BILZ, *supra* note 3, at 13 (emphasizing that environmental problems are difficult to solve because they are diffuse, complex, and tend to impact nonhuman species); RHETT LARSON, JUST ADD WATER 11–12 (2020) (observing that climate change lacks resonance for many because it is framed in terms that seem inconsequential, distant, or abstract); Elke U. Weber, *Experience-Based and Description-Based Perceptions of Long-Term Risk: Why Global Warming Does Not Scare Us (Yet)*, 77 CLIMATIC CHANGE 103, 108 (2006) (explaining why the threat of climate change does not elicit visceral reactions from many Americans).

problem. Although this point is not unique to indivisible resource problems, it carries particular significance where a certain threshold of cooperation is critical to success.

The sections below consider how we might overcome those obstacles to enable people to put together resources and cooperation in socially valuable ways.

A. Concretization

Problems that are vivid, concrete, immediate, and discrete attract more attention—and are more likely to spur cooperative action—than diffuse, distant, and abstract threats. One manifestation of this tendency is found in the psychological preference for helping specific "identifiable victims" over larger numbers of undifferentiated people or "statistical lives."[83] That environmental concerns often involve long-run harms to large numbers of unidentified people (many of whom are not yet born) presents a policy challenge.[84] Similarly, conservation resources are disproportionately directed toward "charismatic megafauna" like tigers or polar bears over species that are less visible or harder to identify with, like insects, fish, or invertebrates.[85] Resource threats that are entirely invisible, like greenhouse gases, or that are masked by the mobility of the resource units, as in the case of the passenger pigeon, may escape attention altogether.[86]

Although these tendencies seem like cognitive biases or errors, we can also understand them as rational reactions to coordination problems that depend on attracting the attention—and cooperation—of others. A stag hunt is a compelling metaphor for a coordination game because it features a visible, concrete, well-

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83. *See, e.g.*, Thomas C. Schelling, *The Life You Save May Be Your Own*, CHOICE AND CONSEQUENCE 113, 115 (1984); Cynthia Cryder and George Loewenstein, *The Critical Link Between Tangibility and Generosity*, in THE SCIENCE OF GIVING: EXPERIMENTAL APPROACHES TO THE STUDY OF CHARITY 237 (Daniel M. Oppenheimer and Christopher Y. Olivola, eds., 2010).

84. *See e.g.*, Shi-Ling Hsu, *The Identifiability Bias in Environmental Law*, 35 FLA. ST. L. REV. 433 (2008).

85. *See, e.g.*, ROWELL & BILZ, *supra* note 3, at 198–203; Andrew Metrick & Martin L. Weitzman, *Patterns of Behavior in Endangered Species Preservation*, 72 LAND ECON. 1 (1996).

86. *See, e.g.*, ROWELL & BILZ, *supra* note 3, at 38 ("[Pollutants'] diffuse, invisible nature makes it hard to take them seriously—we tend to forget their effects or their importance in favor of more immediate, visible phenomena."); Edella Schlager et al., *Mobile Flows, Storage, and Self-Organized Institutions for Governing Common-Pool Resources*, 70 LAND ECON. 294, 297–98 (1994) (detailing the informational challenges presented by mobile resource flows, including the difficulty of assessing declines and connecting them with harvesting behavior, and the resulting dampening of incentives to take corrective action); Graham Epstein et al., *Governing the Invisible Commons: Ozone Regulation and the Montreal Protocol*, 8 INT'L J. COMMONS 337, 347 (2014) (noting the problems presented by the mobility and invisibility of ozone and ozone-depleting substances).

defined objective that two players can completely achieve if they work together. There is no similarly stylized game for addressing the long-range effects of incremental sea rise or the chain reactions that accompany diminutions in biodiversity. People may perceive that their efforts are best directed towards problems that are compelling enough to also appear on the radars of many other people.

We need not take problems as we find them, however. The way in which issues and contributions are framed can add concreteness and immediacy to situations that might otherwise appear hopelessly vague and abstract. Charitable organizations, well aware of the power of framing, employ a variety of strategies to make problems appear concrete and their solutions achievable. The idea of "symbolically adopting" or sponsoring a particular animal, or funding some specific need (acquisition of a certain increment of habitat space, for example), can turn large and abstract problems into a series of discrete and solvable ones. The more visible these targeted efforts appear, the more confidence they will inspire in would-be contributors that others will similarly contribute.

A compelling image can help supply this type of visibility. For example, a recent online news feature used infrared images to show methane gas emissions—a form of pollution that is otherwise invisible to the naked eye.[87] Vivid manifestations of problems that are otherwise hard to access visually can also attract attention and mobilize support for solutions. The 2010 Deepwater Horizon oil spill, a massive leak in a BP-operated well 5,000 feet underwater, became urgently real to many people only after BP released an underwater video feed showing the leak gushing forth in real time. As Barack Obama explains, "Suddenly people around the world could see the oil pulsing in thick columns from the surrounding wreckage."[88]

Interestingly, the high degree of connectivity among resources—their very indivisibility—often works in favor of approaches that focus on their most highly salient features. A keystone species, for example, can serve as a bellwether for how a larger ecosystem is doing as well as a visceral representation of the stakes involved.[89] A simple, periodic measure of some visible attribute—the measured

87. *See* Jonah M. Kessel and Hiroko Tabuchi, *It's a Vast, Invisible Climate Menace. We Made It Visible*, N.Y. TIMES (Dec. 12, 2019) https://www.nytimes.com/interactive/2019/12/12/climate/texas-methane-super-emitters.html.

88. BARACK OBAMA, A PROMISED LAND 568 (2020).

89. *See* SALA, *supra* note 55, at 81 (citing Robert T. Paine for the idea of a "keystone species" which "has an effect on the entire ecosystem" that "is disproportionately greater than its abundance.").

clarity of Lake Tahoe, for example[90]—can stand in for tomes of detailed data about how development, runoff, and micro-organisms relate to each other. Having concrete, solvable problems stand in for larger and more abstract ones has another advantage: it enables people to signal their willingness to cooperate in the larger enterprise.[91] In short, we should look for ways to use the visible to leverage the invisible.

In the climate change context, for example, researchers have noted the potential value of focusing policy attention on "co-emissions"—ambient air pollution that accompanies carbon dioxide emissions but that has localized, near-term health effects.[92] Building mitigation efforts around these more tangible and immediate impacts can help make headway on the larger and more abstract problem of carbon emissions as well. Rhett Larson suggests another interesting concretization move: shifting the focus of environmental discourse from climate change to water security.[93] The two are related, but the latter concretely affects people's lives in ways that tend to be more visible and immediate.[94] Coordinating to address water issues that will have a direct impact on people's lives today can both further larger sustainability goals and provide a workable platform for coordinating toward larger efforts.

Yet even water may prove an insufficiently visible resource in some contexts. Interestingly, droughts and water shortages may be more visible in places that generally have ample surface water supplies, as Kate Pride Brown points out, because it is possible to actually observe changes in water levels.[95] She notes that people in Atlanta are better able to "see" water scarcity than people in a desert environment like Phoenix that relies on groundwater that is out of sight—making its scarcity invisible. Here too, conscious

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90. Lake clarity is measured annually by lowering a white Secchi disc into the lake to determine the depth at which it remains visible. U.C. Davis, Tahoe Environmental Research Center, *Tahoe: State of the Lake 2020*, (2020), https://tahoe.ucdavis.edu/sites/g/files/dgvnsk4286/files/inline-files/2020_SOTL_Complete.pdf.

91. *See* SCHELLING, *supra* note 46, at 112 (explaining how a focal point may be "a small piece of the game that comes to symbolize the game itself, setting a pattern of expectations that extends beyond the substance of the point involved"). Similarly, a visible practice can serve as a signal of compliance with related but less visible norms, potentially spurring broader compliance with even the less visible norms. *See* McAdams, *supra* note 67, at 415 n.259 ("If a visible test reliably predicts compliance with a norm for which violations are more difficult to detect, and the latter norm benefits the group, then the group may be better off having the former norm.").

92. *See* Drew Shindell et al., *Quantified, Localized Health Benefits of Accelerated Carbon Dioxide Emissions Reductions*, 8 NATURE CLIMATE CHANGE 291 (2018). I thank Hajin Kim for this example.

93. LARSON, *supra* note 82, at 11–29.

94. *See id.*

95. Brown, *supra* note 3.

efforts at improving visibility may become important. For example, San Antonio has been able to consciously raise the visibility of its groundwater supply by including the Edwards aquifer level in daily weather reports.[96] This example connects to a second approach to problems of visibility: finding ways to provide observable feedback about the changing state of a resource system.

B. Feedback

Solving collective action problems requires perceiving causal connections between individual decisions and the results that play out in the world. In stylized games or simple physical interactions, players receive immediate, tangible feedback about the effects of their decisions.[97] But in many resource settings, these connections are opaque or attenuated.

Extreme forms of attenuation between acts and outcomes prevail in many environmental contexts. As Rowell and Bilz explain, "[i]n a literal and figurative sense, . . . it is impossible for individuals to 'see' the impacts of their climate behaviors on the global climate."[98] Globalization contributes to what Richard Lazarus has called "a cognitive severance of environmental cause and effect."[99] Those making decisions with environmental impacts frequently do not have to live with, or in some cases even know about, the negative effects of their actions. As Lazarus explains, "American consumers . . . could not readily perceive the environmental impact of their purchasing decisions, as the impact on the world environment was effectively masked by distance."[100] In addition to being spatially distant and causally attenuated, environmental impacts may be dispersed in ways that make them hard to track, as in the case of the passenger pigeon.[101]

When feedback comes too slowly, coordination can fail dramatically, especially where indivisible goods are concerned. Schelling illustrates the effects of lagged feedback with the example of a sightseeing boat that encounters a group of porpoises.[102] The passengers all rush to one railing to view the porpoises, which soon causes the ship to tilt dangerously to one side. Fearing the boat will

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96. *See id.* at 230–31.

97. *See, e.g.,* MCADAMS, *supra* note 80, at 5–6 (explaining how the center line on a road "gives immediate feedback on far it is safe to venture in that direction").

98. ROWELL & BILZ, *supra* note 3, at 232.

99. LAZARUS, *supra* note 24, at 213.

100. *Id.*

101. *See supra* notes 25–26 and accompanying text.

102. SCHELLING, *supra* note 61, at 85.

capsize, all of the passengers rush to the opposite railing. But their initial relief—the deck is leveling out!—turns quickly to terror when they understand that the ship is now tilting even more violently (due to momentum) in the opposite direction.[103] Capsizing is an all-or-nothing event that everyone in the boat has an interest in avoiding, but their concerted action may actually bring it about.

As this example suggests, if we wait for observable feedback from the physical world about the aggregate effects of our individual choices, it may be too late to salvage the situation. If we can help people see what is happening sooner, and how it connects to individual choices, it becomes easier to avert disaster. Even a simple metric—the daily information about aquifer levels mentioned above, for example—can help people recognize shortages and calibrate their conservation efforts accordingly. In one influential study, the ability to see resource units declining in a simulated replenishing resource game helped move participants closer to an optimal harvesting strategy.[104]

Some forms of feedback enable people to monitor the impact of their own choices, such as data about household energy usage and how it compares to that of one's neighbors.[105] Because people tend to view their own acts through a self-biased lens, even those who mean to act fairly may unwittingly take more than their share.[106] Left to guess about how one's behavior measures up to that of others, people tend to mentally amplify their own positive contributions or minimize their negative impacts. Objective data about how one's choices measure up can act like a mirror to correct misimpressions about conduct and encourage better choices.[107] Feedback can even be built into the resource environment itself, whether through resource units that are segmented in some way

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103. *Id.*

104. Cass & Edney, *supra* note 1.

105. *See, e.g.,* Ian Ayres et al., *Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage*, 29 J.L. ECON. & ORG. 992 (2013); Hunt Allcott, *Social Norms and Energy Conservation*, 95 J. PUB. ECON. 1082, 1087, 1090–91 (2011) (finding modest average reductions in energy conservation through a system of providing feedback about how a household's usage compared to its neighbors, with significant heterogeneity, and with decay over time).

106. *See, e.g.,* Linda Babcock et al., *Biased Judgments of Fairness in Bargaining*, 85 AM. ECON. REV. 1337 (1995) (examining self-serving evaluations of fairness in the settlement context); Kimberly A. Wade-Benzoni et al., *Egocentric Interpretations of Fairness in Asymmetric, Environmental Social Dilemmas: Explaining Harvesting Behavior and the Role of Communication* 67 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 111 (1996) (finding egocentric biases in a simulated resource dilemma); Thompson, *supra* note 1, at 260.

107. *See* Gregory Mitchell, *Libertarian Paternalism Is an Oxymoron*, 99 NW. U. L. REV. 1245, 1257–58 & n.46 (2005) (citing studies on the effects that actual mirrors have on behavior).

or standardized harvesting equipment (a particular type of net, for example) that facilitates metering and self-monitoring.[108]

Making problems and their connections to human decisions more visible and salient does not always result in a cooperative outcome, however. In some contexts, understanding the game more clearly might make people behave even more selfishly (so as to get more of the resource before things collapse altogether). But, as we have seen, it can actually serve one's narrow self-interest to act cooperatively in contexts involving indivisible goods—although this depends crucially on what others will do. This brings us to a third approach to enhancing visibility: constructing focal points that enable people to more accurately predict the strategies others will adopt.

C. Focal Points

Focal points can help people coordinate their responses to achieve indivisible goals.[109] Consider a pure coordination game: deciding which side of the road to drive on.[110] No one needs to appeal to legal enforcement or even shared norms to make people cooperate by sticking to the appropriate side of the road; self-interest can do the job quite nicely. Getting everyone to coordinate in this manner creates an indivisible good of safe travel, and it is in everyone's interest to contribute to providing it. All that is necessary is a focal point that enables everyone to coordinate their actions.[111] The law—even without enforcement—can serve as that focal point.[112] So too could any highly visible signal, sign, or feature of the environment.[113]

A simple signal or announced rule is sufficient in the driving setting because the terms of the game are clear: the stakes are high, everyone's cooperation is essential, no one has anything to gain by defecting (or threatening to), and the effects of noncooperation are straightforward and evident to all. In other words, the problem, its structure, and its basic solution (choose a side) are already visible, and all that is needed is some basis for predicting what others will do. A clear, shared focal point provides that basis.

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108. *See* Lee Anne Fennell, *Slicing Spontaneity*, 100 IOWA L. REV. 2365, 2369–71 (2015).

109. Thomas Schelling famously developed the idea of focal points. *See* SCHELLING, *supra* note 46, at 53–118.

110. *See, e.g.*, MCADAMS, *supra* note 80, at 22–23 (discussing this "classic example").

111. *See id*.

112 *Id.*

113. *See, e.g., id.* at 23–26 (describing how a visible "Bystander" with no formal authority can successfully direct traffic in an intersection); FENNELL, *supra* note 6, at 60–61 (discussing how physical segmentation can serve as a focal point).

As the "focal" metaphor suggests, these points of reference must be visible and salient to the participants in a given collective action game. They need not be announced in advance if shared knowledge or other clues can make a certain reference point stand out within a particular community. Thomas Schelling famously posed the problem of when and where to meet in New York City on a given day if there was no chance to coordinate: the most popular response was Grand Central Station at noon.[114] Some feature of the landscape that stands out can help people to match their strategies, even when their interests are at least partially in conflict. For this reason certain solutions like splitting things 50-50 can stand out and enable deal-making by resisting small shifts in either direction that would unravel consensus.[115]

Similarly, a focal solution can emerge organically out of a situation involving shared resources if there is an obvious basis for making an allocation. For example, ten friends who meet regularly and share a plate of twenty shrimp may naturally fixate on the solution of eating two shrimp per person (a choice made easier by the readily divisible number of shrimp, the discreteness of the shrimp units, and the tails that serve as reminders of one's consumption tally).[116] This solution is by no means guaranteed: the situation may instead devolve into a free-for-all.[117] But the prospects for cooperation get a boost when players can quickly identify an easy-to-implement strategy that everyone can observe as it unfolds. Not only can participants readily see what strategy others are pursuing, they can also keep tabs on how their own consumption compares.

Some visible actions can serve as proof of investments made toward a cooperative strategy. Imagine, for example, that a particular piece of clothing or equipment was essential to hunting stag, so that wearing or carrying that item would credibly communicate to others that one was planning to hunt stag rather than chase rabbits. Here it becomes interesting to consider what kinds of cooperative strategies are visible to others or can be made so with the right framing devices.[118] Consider the push to make

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114. SCHELLING, *supra* note 46, at 55.

115. *See id.* at 71–72.

116. *See* LEWIS, *supra* note 37, at 96; FENNELL, *supra* note 6, at 54.

117. *See* LEWIS, *supra* note 37, at 96 (noting that the shrimp situation has two stable solutions: a "social contract" or a "state of nature" in which participants grab all they can as quickly as they can).

118. *See, e.g.,* Daphna Lewinsohn-Zamir, *The Conservation Game*, 20 HARV. J. OF L. & PUB. POL'Y 733, 756–57 (1997) (discussing the importance of visibility in promoting cooperation and observing that certain actions with respect to historic preservation, like demolishing a building, are highly visible).

brown lawns a source of pride during a drought—a strategy that the City of Santa Barbara pursued some years ago.[119] One's brown lawn evinced cooperation and elicited more cooperation from others. By making the brown lawn trendy, social norms and pressures could push in a conservation direction.[120]

Contrast this situation with a sudden water shortage at Stanford that led the campus to call for students to cease showering for roughly three days.[121] Unlike the brown lawn, which is highly visible and public, showering is conducted in private and is not observable to others. A study of this situation found systematic misperceptions about what others were doing. For example, students who showered during the water crisis tended to believe that others were showering to a greater extent than did students who did not shower.[122] It would have been interesting to see whether some visible marker (an ink stamp on the forearm that would readily wash off during showering, perhaps, or a wristband that would disintegrate with prolonged contact with water) would have made a difference in behavior by correcting beliefs about the behavior of others.

Where the visibility of a practice is central to solving a resource dilemma, invisible cooperation can be unhelpful or even counterproductive. For example, some homeowners have resorted to painting their lawns green during droughts.[123] This enables those who are actually pursuing the conservation strategy to enjoy the aesthetic benefits of failing to do so, but it masks the prevalence of cooperation. It likewise provides protective cover for non-cooperators—shaming people for having green lawns may misfire

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119. *See* Jeremy Chow, *Gold Is the New Green: Thinking Environmental Shame in Drought Times*, 6 RESILIENCE 1 (2018).

120. Scholars have recognized the role of visibility in promoting the spread of social norms. *See, e.g.,* Maria Knight Lapinski & Rajiv N. Rimal, *An Explication of Social Norms,* 15 COMMUNICATION THEORY 127, 141–43 (2005); Patrice Wylly, *Evaluating the Costs of Technology Neutrality in Light of the Importance of Social Network Influences and Bandwagon Effects for Innovation Diffusion*, 23 N.Y.U. ENVTL. L.J. 298, 341–49 (2015); Jed S. Ela, *Law and Norms in Collective Action: Maximizing Social Influence to Minimize Carbon Emissions*, 27 UCLA J. ENVTL. L. & POL'Y 93, 123–43 (2009); McAdams, *supra* note 67, at 361 (describing how the "risk of detection" contributes to the development of norms). *But see* Wokje Abrahamse & Linda Steg, *Social Influence Approaches to Encourage Resource Conservation*, 23 GLOBAL ENV'T CHANGE 1773 (2013) (in a meta-analysis of social influence approaches, finding that "[a] social influence approach was no more or less effective for observable behaviours compared to behaviours that are less observable"). These findings suggest that where other forms of direct social influence are present, visibility in the form of observable behavior may not make a marginal difference.

121. *See* Monin & Norton, *supra* note 76.

122. *Id.*

123. *See* Amy Graff, *More Californians Painting Their Lawns Green*, SFGate, (May 14, 2015), https://blog.sfgate.com/stew/2015/05/14/more-californians-painting-their-dry-lawns-green/.

if some of the green lawns are really brown lawns that have been dyed. Similar points might be made about plant-based food that looks like meat, synthetics that look like fur or leather, and so on. These innovations can make it easier for people to opt for what might be regarded as the more sustainable or "cooperative" path but, by allowing cooperators to blend in with noncooperators, can also reduce the visibility of their choice in ways that may keep it from gaining ground.

More broadly, the phenomenon of "conspicuous conservation"—a counterpoint to earlier forms of "conspicuous consumption"—has received attention.[124] Bright blue recycling bins, "I Voted" stickers (and similar stickers for being vaccinated against COVID-19),[125] and distinctively shaped electric cars all can help make a particular practice visible.[126] Having a centralized source of visible information about the strategies that others are pursuing can also help spur what Robert Frank has called "behavioral contagion."[127] Frank gives the example of Google's Project Sunroof, which lets people easily see who has installed solar panels—a source of information that can both document and encourage the spread of the practice.[128]

One concern with prioritizing visibility is that it might lead people to fixate unduly on following a practice that is highly visible, to the detriment of alternative approaches that are actually more effective (or less costly and equally effective) but that operate out of sight. For example, some people might more effectively reduce their carbon footprints or their water consumption through means other than solar panels or brown lawns. One response would be to find ways to make less visible practices focal for subsets of the population that value them (for example, gardeners who find other ways to support sustainable water use practices), through information-

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124. The concept of "conspicuous consumption" comes from THORSTEIN VEBLEN, THE THEORY OF THE LEISURE CLASS (1899). For a recent discussion, see Nestor M. Davidson, *Property and Relative Status*, 107 MICH. L. REV. 757 (2009). On "conspicuous conservation," *see*, *e.g.*, Steven E. Sexton & Alison L. Sexton, *Conspicuous Conservation: The Prius Halo and Willingness to Pay for Environmental Bona Fides*, 67 J. ENVIRON. ECON. & MGT 303 (2014); Vladas Griskevicius et al., *Going Green to Be Seen: Status, Reputation, and Conspicuous Conservation*, 98 J. PERSONALITY & SOC. PSYCH. 392 (2010).

125. The Center for Disease Control (CDC) has released sticker designs that proclaim, "I Got My COVID-19 Vaccine!" *Communication Resources for COVID-19 Vaccines*, CDC, https://www.cdc.gov/coronavirus/2019-ncov/vaccines/resource-center.html#printable-stickers.

126. *See, e.g.,* Griskevicius et al., *supra* note 125, at 399 (observing that "the highly visible and easily identifiable Toyota Prius . . . essentially functions as a mobile, self-promoting billboard for proenvironmentalism"); Wylly, *supra* note 121, at 342 (observing that the Prius was "purposefully contrived to be visible").

127. ROBERT H. FRANK, UNDER THE INFLUENCE: PUTTING PEER PRESSURE TO WORK 156 (2020).

128. *Id.* at 156–57 (discussing Google's Project Sunroof, https://www.google.com/get/sunroof).

sharing mechanisms.[129] Although there are no doubt limits to how much can be made focal, given the limits of human attention, the takeaway is not that we should rally around whatever practices happen to be most visible now. Rather, considering how existing forms of visibility support coordination can help us more thoughtfully construct focal points.

D. Social Norms and Self Interest

Much of the scholarly discussion around visibility has focused on its capacity to activate and spread social norms.[130] As the examples above suggest, conservation norms can catch on as people observe others adopting them.[131] Despite concerns about faux signaling that does not correspond to real behavioral changes (as well as worries about being perceived to engage in such insincere behavior),[132] visibility enhancing measures can serve as an important form of norm entrepreneurship.[133] But, importantly, norms are not the only moving part in the story, when it comes to achieving indivisible goals. Narrow self-interest can also help to support cooperation even in the absence of shared norms, as we have seen already. How do these two factors combine?

Where a practice (recycling, say) is indeed backed by shared norms, people who follow the practice may receive an immediate payoff in the form of esteem from others or a sense of pride in having done the right thing.[134] This payoff helps support the cooperative move even where it is not likely to be pivotal to achieving a lumpy shared goal (such as preserving a species). Put in terms of our stylized games, it is as if hunting stag becomes inherently more rewarding as an activity than chasing rabbits (whether or not any stag are brought down), or as if one earns honor in a game of Chicken from swerving rather than driving straight. In other words,

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129. I thank Richard McAdams for conversations on this point.

130. *See supra* note 121 and accompanying text. *See also* Gregg Sparkman and Gregory M. Walton, *Dynamic Norms Promote Sustainable Behavior, Even if It Is Counternormative*, 28 PSYCH. SCI. 1663, 1673 (2017) (observing that a changing trend can push people to adopt practices (like eating less meat) that diverge from current prevailing practices "[i]f this change is visible, appears willful, reflects the importance of the issue, and is taken as a sign of what is to come").

131. Visibility can also activate existing norms by enabling self-monitoring that makes one's own acts clearer. *See supra* note 107 and accompanying text.

132. *See, e.g.,* Jonathan Z. Berman, *The Braggart's Dilemma: On the Social Rewards and Penalties of Advertising Prosocial Behavior*, 52 J. MKTG. RES. 90 (2015).

133. *See* Cass R. Sunstein, *Social Norms and Social Roles*, 96 COLUM. L. REV. 903, 929 (1996).

134. *See, e.g.,* McAdams, *supra* note 76, at 380–81; *cf.* ULLMANN-MARGALIT, *supra* note 36, at 37 (describing how factors like esteem and dishonor alter payoffs for soldiers confronting a strategic dilemma).

it changes the payoffs of the cooperative strategy even in the event the other person does not also cooperate. In this way, widely shared norms can promote *unconditional* cooperation within a particular interaction.[135]

Making contributory efforts feel independently worthwhile as a matter of principle thus offers a way to square small concrete steps with large indivisible goals. In the context of voting, the notion of doing one's civic duty for internally compelling reasons helps to overcome the sense that it is irrational to bother when one's chance of making a difference is so remote.[136] Benjamin Hale has recommended a similar approach in the climate change context: by individually taking steps that are deemed worthwhile for their own sake, people may be able to collectively stave off some of the worst outcomes.[137] Indivisibilities in social norms themselves—the fact that they are generally adopted in "lumps" rather than picked up and discarded situation by situation—can allow small visible acts to stand in for larger commitments.[138]

The other channel through which visible practices work to promote cooperation relies not on shared norms but rather on enabling people to better observe or predict whether other players are choosing the cooperative strategy. Such insights provide no traction in a Prisoner's Dilemma game because one's best choice (under the strict assumptions of the game's payoffs, and assuming no repeat play) does not depend on what others do; defection is always best.[139] But in differently structured games like the Stag Hunt or Chicken, one's best strategy (on a purely rational calculus) depends on what the other players are going to do. In those game structures, a better payoff from cooperation arises not unconditionally (as it does in the case of norm-following) but rather conditionally, based on how one's own choices combine with those of others.[140]

Where an indivisible good is involved, being able to see others' strategies can avoid disaster, but it can also help some parties take advantage of others to reap larger rewards. Fearing being suckered,

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135. This cooperation remains contingent on norms being widely enough shared and adopted in the relevant society to generate payoffs that favor cooperation regardless of the specific moves of the other player.

136. *See* Hale, *supra* note 70, at 381, 386 (discussing the "paradox of voting" identified in ANTHONY DOWNS, AN ECONOMIC THEORY OF DEMOCRACY (1957)).

137. *Id.* at 386.

138. *See supra* note 91 and accompanying text. For discussion of drawbacks of lumpiness in norms, see Adrian Vermuele, *The Invisible Hand in Legal and Political Theory*, 96 VA. L. REV. 1417, 1431–38 (2010).

139. *See supra* notes 30–31 and accompanying text.

140. *See supra* Part II.B.

parties may miscalculate and wind up contributing to a disaster. Norms that make the cooperative action independently attractive (or that allow for a form of "punishment" of defectors through shaming or withholding esteem) can therefore backstop self-interest in ways that support cooperation.

E. Putting it All Together

Concretization, feedback, focal points, and norms can all leverage visibility to produce indivisible goods and avoid indivisible bads. But they work best in combination. The core challenge of many large, intractable problems is to get people to see how their many small interacting decisions can change the world. This requires two kinds of vision: seeing the structure of problems clearly, and seeing how one's own choices can combine with those of others to solve them. Developing these ways of seeing is not costless, however. Solving resource dilemmas on the ground requires solving a second-order collective action problem: building platforms and technologies that can enable people to view problems concretely and coordinate strategies. What is required is widespread investment in *configuration entrepreneurship*—the art and science of putting resources and cooperation together in their most valuable combinations.[141]

Modern technology offers ample tools for innovating in the configuration space, as many existing and emerging models attest—from Airbnb to Zipcar, from Groupon to Kickstarter. The same moving parts can be used to make resource problems concrete, offer focal solutions, and provide real-time feedback on progress. Mechanisms for dividing up contributions to common goals into slices that people are willing and able to provide can combat the sense that one's own choices are too insubstantial to matter by making the power of aggregation visible.

Consider the emerging consensus that one of the most useful measures that ordinary people can take against climate change involves a shift in dietary habits.[142] Plant-based diets dramatically reduce greenhouse gas emissions. Yet going fully vegetarian or vegan, framed as an all-or-nothing proposition, may be too large a step for many meat eaters. Nonetheless, a much smaller dietary shift could have a tremendous cumulative effect when multiplied by hundreds of thousands of people. In this vein, some have advocated

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141. *See* FENNELL, *supra* note 6, at 2.

142. *See, e.g.,* Lingxi Chenyang, *Is Meat the New Tobacco? Regulating Food Demand in the Age of Climate Change*, 40 ENVT'L L. REPORTER 10344–45.

part-time vegetarianism or other forms of "flexitarian" diets.[143] But these calls would be more successful if people could actually see how their small contributions combine with those of others to produce concrete change.[144]

Imagine, following an idea proposed by Matt Johnson, a "build a vegan" site on which people could commit to giving up meat for some portion of a day or week in order to assemble together the dietary equivalent of a person shifting entirely to a meatless diet.[145] As the number of plant-based virtual people grew, graphics might show how these gains translate into influencing real metrics, like ice cap melt or sea level rise, with impacts on people's lives or on the survival of high-profile animals like polar bears. Once people can see how changes translate into results (even through a virtual representation) such a site could become focal. Many variations on these ideas are of course possible. The central point is that enhancing visibility to support cooperation is within our reach. The key is developing tools that help people see what they can do.

V. CONCLUSION

Resource dilemmas often seem intractable. Although the stakes are high, environmental impacts, and their connection to innumerable small, interacting, individual decisions, can be hard to pin down. It is easy to assume that tragedy will prevail, at least in contexts where coercion is unlikely to be feasible or availing. But one underappreciated factor—the indivisibility of many of the relevant goods and bads—dramatically changes the game from one in which everyone is always better off defecting to one in which winning strategies depend crucially on expectations about the behavior of others.

By no means is cooperation assured: things can go very badly indeed where cliff effects and all-or-nothing dynamics are involved. Yet the potential exists for people to coordinate their decisions, avoid tragedy, and achieve sustainable results. Visibility, I argue, is

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143. *See, e.g.,* SALA, *supra* note 55, at 214–15 (noting the environmental advantages of "[a] 'flexitarian' diet based mostly on plants, with occasional meat consumption"); Ian Ayres, *Vegetarianism as a Sometimes Thing*, FREAKONOMICS, (June 19, 2009), http://freakonomics.com/2009/06/19/vegetarianism-as-a-sometimes-thing/ (presenting a one-day-a-week-vegetarian idea suggested by Matt Johnson).

144. *Cf.* Sparkman & Walton, *supra* note 131 (investigating how "dynamic norms"—the knowledge of a growing trend, even if not yet a dominant practice—might support reduced meat consumption).

145. Johnson explained his idea this way: "[S]ay a group of 7 people signed a contract saying that each of them would go meatless on an assigned day each week. Thus, within the group each member could eat meat 6 days a week, but there would be one vegetarian at all times." Ayres, *supra* note 144 (quoting Johnson).

a key lever for making cooperation work under conditions of indivisibility. And the fact that both indivisibility and visibility can contribute to cooperative solutions means that we can actively work to frame resource dilemmas around these features.

In a sense, visibility is a metaphor for perception and understanding—seeing the problem as a problem, perceiving its structure, and understanding the connection between individual decisions and outcomes. But visibility is also literal. Resource problems that provide visceral feedback can be used to coordinate action. Harvesting methods or conservation practices that enable observation and monitoring can assist in generating and sustaining cooperation. Focal points, which often rely on visible features, can give rise to shared expectations about actions.

For all its power, visibility is not a panacea. It can even backfire in some contexts by allowing people to see opportunities to gain from noncooperative behavior. But recognizing where and how it works can shed new light on how to approach our most important—and most indivisible—problems.