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Beyond Zero-Sum Environmentalism

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Summary

Environmental law and environmental protection are often portrayed as requiring trade offs: "jobs versus environment," "markets versus regulation," "enforcement versus incentives." In the summer of 2016, members of the Environmental Law Collaborative gathered to consider how environmentalism and environmental regulation can advance beyond this framing to include new constituents and offer new pathways to tackle the many significant challenges ahead. Months later, the initial activities of the Trump Administration highlighted the use of zero-sum rhetoric, with the appointment of government officials and the issuance of executive orders that indeed seem to view environmental issues as in a zero-sum relationship with jobs or economic progress. In the essays below, the authors explore the meaning and the role of zero-sum environmentalism as a first step in moving beyond it.

I. What We Talk About When We Talk About Zero-Sum Environmentalism

This section was authored by Jessica Owley, Professor, SUNY Buffalo Law School.

In the summer of 2016, a small but hardy group of law professors gathered to discuss the concept of zero-sum environmentalism. We had set for our agenda to get "beyond" zero-sum environmentalism. The suggestion was that there is a dominant approach to environmental law issues that frames them as zero-sum and that this framing can be damaging to environmental progress. What we grappled with, though, is whether environmental problems really are (at least at times) zero-sum. Is the description of an environmental issue as zero-sum ever accurate? Are laws treating issues as zero-sum when they should not be doing so? Or maybe ignoring a zero-sum framework that is at play?

Perhaps there are no zero-sum dynamics in the real world and instead "zero-sum" is just the language we (or some of us) use to describe environmental trade offs. Zero-sum as used in the context of environmental policy implies stark winners and losers. If the environment wins, the economy must lose. To protect the owls, we destroy the lives of the loggers. To prevent global climate change, Americans must completely change life as they know it. Indeed, the concept, if not language, of zero-sum appears particularly prevalent in the new Donald Trump Administration, where actions in favor of environmental protection are couched as actions against the economy.

Our discussions revealed (unsurprisingly) that we all came to this question with different examples, assump-

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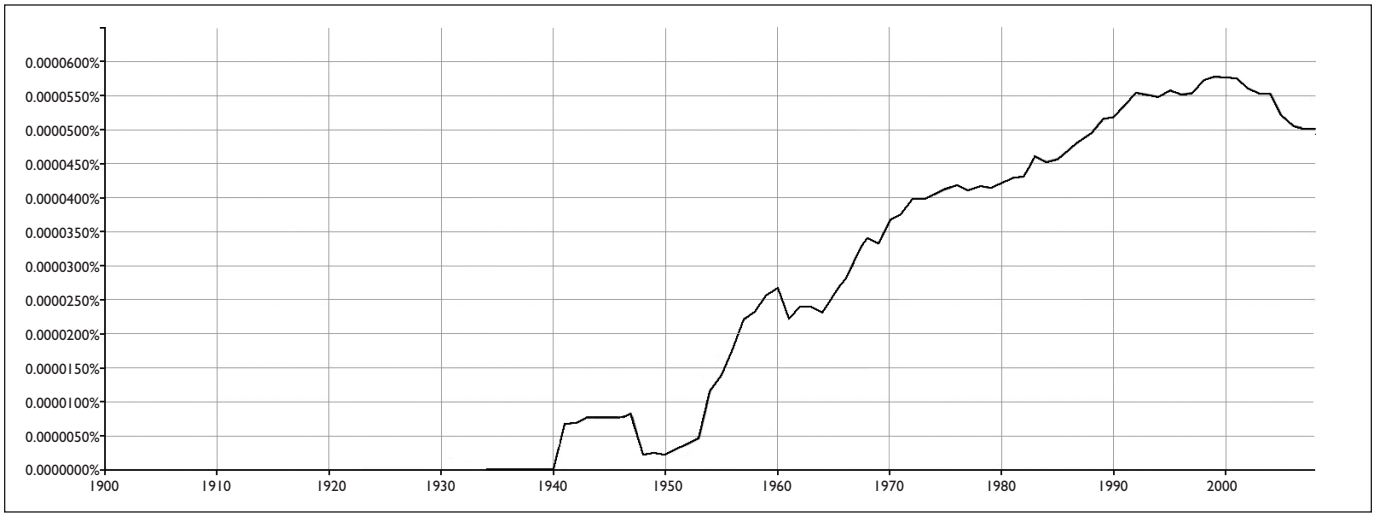
Figure 1: Ngram of "Zero-Sum"



tions, and solutions. Some people rejected the idea that zero-sum problems ever actually exist, and suggested that reliance on the framework and use of the term can be damaging to environmental governance—not just because it is an overly constrained view of how trade offs actually work, but also because the language of zero-sum necessarily creates a combative stance that can impede collaboration and creative thinking. Others suggested that for some environmental concerns, the zero-sum framework was underused. That is, we might reach better results if we confront the actual trade offs. What work does it do to label environmental problems as a zero-sum game? In this case, climate change and biodiversity protection serve as key examples. Maybe we do need to emphasize that you cannot have your cake and eat it too. Building that hospital will indeed lead to the extinction of a species. Putting the conundrum in stark terms might help highlight the need for embracing the principle of *in dubio pro natura*[1] (when in doubt act in favor of nature).

Most of us agreed, however, that when we see the zero-sum rhetoric or when we use it ourselves, we are not really talking the language of economists.[2] We are taking their term and simplifying it (taking a complex topic from another discipline and simplifying it for our use is something we legal academics are good at).[3] But more than that, we realized that we are not the ones using this term. In fact, it is not heavily used in the legal academy. It *is* used in the media, though, and by politicians.

Figure 1, above, (created by Google's Ngram function) shows an increased use of the phrase "zero-sum" in books first appearing around 1940 and increasingly used since then, with a tapering off beginning in 2000. However, overall, there is not a high frequency of use of the phrase. And "zero-sum environmentalism" did not appear often enough to be plotted with Google's Ngram function.[4]

Following this train of thought, maybe the mission of going beyond zero-sum environmentalism is to reject the use of the term—to emphasize that it is not really occurring. Or maybe it is to show the strength of the attitude of zero-sum. If we think that a zero-sum approach is flawed as overly simplistic, then highlighting where actors/policymakers are treating complex environmental problems as zero-sum issues can reveal flaws in policymaking. Daylighting the zero-sum framework can expose overly simplified approaches to environmental protection efforts, allowing one to target those arenas as needing richer analyses.

Once I began looking for it, I saw zero-sum issues throughout my work. For example, I have often complained about the nature of property law arrangements (specifically conservation easements) to break instead of bend.[5] That is,

1. Josefina Russo & Ricardo Russo, In Dubio Pro Natura: *Un Principio de Precaución y Prevención a Favor de los Recursos Naturales*, 5 Tierra Tropical 1659 (2009).
2. *See*, *e.g.*, Avinash K. Dixit & and Susan Skeath, Games of Strategy: Fourth International Student Edition 225 (2015) (describing basic principles of zero-sum and nonzero-sum games in economics).
3. Or perhaps not that good at. *See*, *e.g.*, Richard A. Posner, *Legal Scholarship Today*, 115 Harv. L. Rev. 1314, 1326 (2002) ("Remarkable, too, is the insouciance with which they discuss concepts from other fields, such as political science, with nary a reference to the scholarly literature in those fields."). *See also* Brian Leiter, *Intellectual Voyeurism in Legal Scholarship*, 4 Yale J.L. & Human. 79, 79-80 (1992) (suggesting that often legal academics incorporate other disciplines in a "sub-standard" or "superficial" way).
4. *See* Google Books, Ngram Viewer, https://books.google.com/ngrams (last visited Mar. 3, 2017). What would be more interesting is to chart this phrase in speeches, academic publications, and news articles, but Google has yet to make such an Ngram (at least not one that is publicly available), and searching through such piles of documents is beyond the task of this essay.
5. *See*, *e.g.*, Jessica Owley, *Conservation Easements at the Climate Change Crossroads*, 74 Law & Contemp. Probs. 199 (2011); Jessica Owley, *Property Constructs and Nature's Challenge to Perpetuity*, in Environmental Law and Contrasting Ideas of Nature: A Constructivist Approach 64 (Keith Hirokawa ed. 2014).

when something starts to go wrong, making it challenging or impossible to comply with a conservation easement, the legal solution from a property law standpoint is to terminate the agreement instead of amending it. Thus, either we have the conservation easement in place or we do not.

You can think about this as arising in other disputes over property as well. Despite the tales of King Solomon,[6] property law does not actually split the baby or often divide up property. Instead, it is commonly an all-or-nothing approach where one person is declared a winner and another the loser. Someone gets mom's house; we do not really draw a line down the middle and force the squabbling sisters to share it (although I think there are probably multiple movies with that story line . . . if not, I call dibs).

Suggesting that the all-or-nothing approach does not need to be the solution for conservation lands, Nancy McLaughlin has successfully argued (and convinced many conservationists and courts) that we should go beyond property law and import charitable trust principles into conservation easement law to enable changes to conservation easements that are more likely to foster greater land protection.[7] Even judges are willing to deviate from the zero-sum approach, as we see with Judge Kevin McCarthy in the famous dispute over Barry Bonds' 73rd home-run baseball, who decided to split the value of the ball rather than award it to one of the parties claiming to have caught it[8]—as would have been the more traditional property law approach.[9] As these examples show, deviations from the zero-sum approach may be increasing in acceptance even in the strict context of property law.

Maybe the problem is not that we need to rethink and find alternatives to the zero-sum approach, but indeed to realize that we never should have framed the problems as zero-sum in the first place. Perhaps labeling things like land conservation as a zero-sum game was reductive from the start (problems are decidedly more complicated than Solomon's baby-splitting approach suggests). In land conservation, for example, we do not simply decide that land is to be set aside for pure conservation in a reserve-like setting or to be actively exploited to generate wealth. Instead, the potential arrangements and uses of the land are numerous. Indeed, we can often both protect environmental features and promote economic returns for the landowners.

Zero-sum analyses in the economic sense are usually modeled as a two-player game.[10] Our land conservation example, however, shows us that it is too simplistic to look at environmental problems that way. It is not simply "Environment" as player one and "People" as player two. A myriad of players and arrangements can be benefited and harmed by choices in land conservation arrangements. Other environmental issues are no less complicated.

The label of "zero-sum" should probably be setting off alarm bells for us. Indeed, we might want to keep close tabs for use of the phrase in environmental contexts. Each time we see policymakers using the terms, it should be a signal to us. Tracking "zero-sum environmentalism" might help highlight a flaw in the system. Whether we reject the framing or embrace it, we all agree that deeper investigation into how policymakers and academics approach environmental concerns can improve outcomes.

II. Seeing Past the Zero-Sum Game in Environmental Policy—Harder Than It Looks

This section was authored by J.B. Ruhl, David Daniels Allen Distinguished Chair of Law, Director, Program on Law and Innovation, and Co-Director, Energy, Environment and Land Use Program, Vanderbilt University.

In *Nonzero: The Logic of Human Destiny*, Robert Wright offers a sweeping view of human evolution that culminates in his argument that modern society has become so complex and interconnected that there are no true "zero-sum" games to be played between people or institutions.[11] Economists and game theorists use the zero-sum game concept to describe a situation in which each participant's gain (or loss) of utility is exactly balanced by the losses (or gains) of the utility of the other participant(s). A zero-sum game is not necessarily a bad situation—in fact, it is what economists argue markets and trading should produce. The reason is that if the situation is nonzero-sum, then, by definition, one participant can gain by more than another loses, or even both can gain. That is why sellers sell products and consumers buy them! The market depends on traders to identify nonzero-sum situations and trade away until they reach zero-sum, which is what economists refer to as Pareto optimality.

Being in a zero-sum game can be a sticky situation, however, if there is some reason why redistribution of the pie is necessary. If it were just up to the participants in a zero-sum game, and assuming they are what economists describe as "rational economic actors," they would not agree to redistribute the pie unless someone (irrationally) volunteers to be made worse off to make someone else better off. But it is not always up to just the participants. Sometimes government, in pursuit of a desired social policy, intervenes to force a "trade" that at least some of the participants would not voluntarily (rationally) make.

If Wright's thesis is right, however, government ought to be able to intervene on behalf of social policy without concern about unsettling participants in zero-sum situations, because most social contexts really operate as nonzero-sum

6. 1 *Kings* 30.
7. *See* Nancy A. McLaughlin, *Conservation Easements: Perpetuity and Beyond*, 34 Ecology L.Q. 673 (2007). *See also* Kolb v. City of Storm Lake, 736 N.W.2d 546 (Iowa 2007) (applying the *cy pres* doctrine to a conservation easement).
8. Popov v. Hayashi, 2002 WL 31833731 (Cal. Sup. Ct. 2002).
9. *See, e.g.*, Zachary D. Kuperman, *Cutting the Baby in Half: An Economic Critique of Indivisible Resource Partition*, 77 Brook. L. Rev. 263 (2011).
10. *See* Dixit & Skeath, *supra* note 2, at 225.
11. Robert Wright, Nonzero: The Logic of Human Destiny (Reprint ed. 2001).

dynamics. Indeed, this is an expressed or implied premise of much of environmental policy, the idea being that net social welfare is increased—the pie only gets bigger—as we protect the environment to protect ourselves. Many environmental protection advocates eschew talking about policy in these crass economic terms, preferring to emphasize the intrinsic value of nature, social justice, and other nonmarket justifications for making people change behavior to improve environmental conditions. But the bottom line is that much of environmental policy rests on the promise of improving the greater good by leveraging the ubiquitous presence of nonzero-sumness.

Take water allocation as an example. If environmental policy moves in the direction of conserving aquatic resources, government might intervene to force farmers using water from a river to reduce diversions and let more water go downstream to, say, an estuary. The key here is that the government does not pay fair market value for the water—the reduced diversion is required by regulation, such as under the Endangered Species Act (ESA). On the surface, this looks like a zero-sum game—every additional gallon going downstream is one less gallon for the farmers, and they are not compensated for their loss. But wait! The increase in water into the estuary improves conditions for a fishery; the fishing and tourism industries thrive; more people can buy the farmers' crops; the farmers can buy less expensive fish; and so on. Everything is interconnected, so nothing is a zero-sum game.

Try telling that to the farmers. The problem with Wright's thesis, and with using it to justify environmental policy, is that it turns back on itself. There is no question that social-ecological systems (SESs) are highly complex and interconnected, making true zero-sum games hard to find. But the sheer complexity of massive SESs is what also makes it excruciatingly difficult to connect all the dots of the nonzero-sum game within the SES. At a macro scale, nonzero-sum rules; at the micro scale of the farmer seeing more water go by the farm in the river, it looks like zero-sum.

One of the major obstacles environmental policy has had in gaining broader and lasting legitimacy is the difficulty of convincing participants who believe they are in zero-sum games and being unfairly treated by environmental regulation that they are in fact in nonzero-sum games, and are going to be fine. Appeals to the intrinsic value of nature do not get very far with most people who feel rammed into such "loser" situations. Indeed, the perception that one or one's community is stuck in an "I/we lose, they win" zero-sum situation can be so strong that social psychologists refer to it as the zero-sum mentality. And there are many factors at play making it difficult for those "afflicted" with this condition to see past the perceived zero-sum game to find the win-win zen of nonzero-sumness.

First, there is the problem of mixed metrics that the participants in the situation are using to assess their positions. For example, in the water allocation scenario, the farmers value gallons of water for crops, the environmental interests value gallons of water for their ecological effect, and other interests value them for other reasons. Counting gallons of water does not get at what groups in the system really value, but it is the easiest metric to count. In a market trading context, so long as each trader knows the value it places on the water, trades will occur until zero-sum equilibrium is met. But in a regulatory context, government is acting as the "market," assigning the values, and forcing the "trades." The various interests thus are more likely to contest the government's assigned values than they would were the reallocation taking place in the market through voluntary trades. The result is that gallons of water becomes the default metric, which makes it difficult for the farmers to see anything but a one-for-one reallocation from them to the other interests—a zero-sum game.

Another obscuring factor is the multi-scalar nature of SESs. The appeal to nonzero-sumness often involves looking at the macro-scale dynamics and evaluating systemwide impacts of a change in allocation of resources, such as through cost-benefit analysis, to demonstrate net gain in social welfare. But many actors in the SES understandably focus on scales most relevant to their well-being, which often are micro-scale in scope. It is at these micro scales that the reallocation begins to look more like zero-sum, as with the farmers in the water reallocation scenario. In short, proving that the macro scale operates in nonzero-sum dynamics does not mean there are no dynamics at smaller scales that come much closer to zero-sum. Expecting the "losers" in those small-scale contexts to think big-picture is a big ask, particularly when it takes teams of ecologists and economists to describe the macro-scale SES dynamics.

There is also the temporal transition dimension to consider. When game theorists study zero-sum game trading behavior, the trades are usually immediate between the traders. In the real world—particularly the world of environmental policy—the trades tend to stretch out over time. Climate change presents this problem in spades, where most of the "losers" bearing the cost of regulation are in the present and most of the "winners" benefitting from the regulation are in the future. The "green jobs" argument for shifting to renewable energy also has this dimension, as the "war on coal" rhetoric frames the dynamic as one community losing jobs in the present to make jobs for others in the future. Even the water reallocation scenario presents this problem, however, as the rehabilitation of the aquatic resources and the wonderful benefits that will flow from it could take decades to materialize to the point of sending benefits back to the farmers—by which time the farmers that gave up the water and bore that cost may no longer be on the scene.

Both the multi-scalar and temporal transition problems are exacerbated by the distribution of costs and benefits leading to what is often an imbalance in magnitude between the costs borne and the benefits received by the "losers." Even if the farmers in the water allocation scenario grow to accept that the nonzero-sumness operates at the

macro-scale, plays out over time, and produces net aggregate social benefit, their particular cost-benefit ledger looks like a bad deal. They bear most of the cost of the water reallocation, but share in the benefits with the rest of the SES community in a diffuse distribution. This problem plagues the ESA, where protection of species often affects specific communities while the claimed benefits of biodiversity are far more diffusely enjoyed.

Even getting a handle on these problems does not necessarily avoid the problem of imprecise valuation. The claim that the water reallocation is a nonzero-sum dynamic can be argued coherently as an ecological, economic, and sociological proposition, but proving it in dollars and cents is a far different matter. In short, we do not have the methods to do it reliably. Biodiversity is great, but how much is it worth? This problem has stymied the integration of ecosystem services concepts into policy decisionmaking—we know that ecosystems provide valuable nonmarket services such as water filtration by riparian habitat, but putting a value on them is quite difficult, particularly at the small scales where one group perceives a zero-sum dynamic with them as the "losers."

Lastly, the polarizing effect of government intervention often complicates environmental policy by immediately and tangibly dividing groups into us-versus-them camps. One can easily imagine the water reallocation scenario as the result of federal regulation supported by national environmental nongovernmental organizations and opposed by a local farming community and its local government. As the interests square off, all the factors discussed above get in the way of the appeal to nonzero-sumness: instead it's crop values versus estuary values, national versus local, long time frames, farmers' loss of water creating diffuse benefits, no reliable dollar signs on the benefit side, and all being crammed down on the farmers by federal regulation with no compensation. One must be rather insensitive to expect the farmers not to suffer from zero-sum mentality in that story line.

Environmental policy needs to take the zero-sum mentality seriously. Pitching environmental regulation as nonzero-sum while not considering pockets of small-scale dynamics that look much more like zero-sum has led over and over to conflict, litigation, and bruised relationships. Ignoring the problem by refusing to speak of zero and nonzero also does not help. This is why work on collaborative adaptive management, quantification of ecosystem services, resilience, and other ingredients of adaptive governance is essential to pursue and sustain.

Adaptive governance must seek to identify pockets of perceived zero-sum games within the larger SES management context, and work with the "losers" to achieve a better framing of the dynamics and explore policy options to counter the zero-sum mentality. Adaptive governance cannot change the physical and social realities of SESs—they have many metrics, are multi-scalar, evolve over time, are uneven in distribution, and are difficult to quantify—but adaptive governance can change the polarizing effect of government intervention and help all participants communicate more openly about perceived zero-sum problems and their solutions.

III. Strategies for Zero-Sum Challenges

This section was authored by Jim Salzman, UCSB Bren School and UCLA Law School.

Politicians love to talk about the glossy world of "Win-Win Scenarios." Battling climate change will also grow the renewables sector and create thousands of green jobs. Catch-shares programs will increase the fishing community's incomes and conserve fisheries. Energy conservation saves fuel bills and drives efficiency improvements. Famed Harvard Business School professor, Michael Porter, has even hypothesized that countries with stricter environmental regulations are more competitive in the global marketplace.[12]

To be sure, there are plenty of examples of win-win scenarios in the environmental field, but it is wishful thinking to assume that many, much less most, environmental conflicts can be solved with all parties better off. It is often the case that one or more parties feel trapped in a zero-sum game. Farmers in the Klamath Valley see their irrigation water allocation reduced because the endangered salmon need more. Fish win. Farmers lose. In the Pacific Northwest's spotted owl saga of the 1990s, logging companies lost access to old growth redwood stands that were deemed to be critical habitat for the endangered owl. Owls win. Loggers lose. One could easily provide similar examples in the pollution context.

Most environmental policies have winners and losers. One might argue that these policies benefit society overall, but it sure does not feel like a benefit to the local resource-dependent communities. These are decisions with diffuse winners and locally concentrated losers. To them, they are trapped in a zero-sum conflict where they need to stand their ground against opposing interests who would have them reduce their emissions, water usage, or timber harvest. "Either I win and continue the status quo, or they win and I have to pay, or perhaps even go out of business."

Given the ubiquity of such zero-sum framing, it should not be surprising that environmental law has developed a range of strategies to address them. They fall under three basic categories: There Should Be Losers, Grow the Pie, or Regulatory Flexibility.

- The first category, **There Should Be Losers**, recognizes the zero-sum game for what it is and lets the consequences flow. Put another way, there are some activities or actors that should lose out. This is a normative position, of course, that favors certain results over others. Companies that discharge dangerous toxics into a local stream should be forced to stop,

12. Michael Porter & Claus van der Linde, *Towards a New Conception of the Environment-Competitiveness Relationship*, 9 J. Econ. Persp. 117 (1995).

even if it does hurt their bottom line. In the zero-sum conflict of continuing polluting versus safe waters, safe waters should win. This may seem a satisfying strategy, but keep in mind that the measure of "unacceptable" behaviors varies according to the observer. Conservation interests may well view overgrazing on public lands as a travesty that has gone on for far too long. Ranching interests take the opposite view. Which will win out in a zero-sum conflict of grazing versus range conservation? That depends on which administration is running the Bureau of Land Management (BLM). A strategy that assumes the losers in zero-sum conflicts deserve to lose looks great if your team is in power. It can seem punitive or worse if you are on the losing side. No wonder, then, that this strategy leads to protracted litigation, overblown rhetoric, and, in the extreme, armed standoffs such as the one that occurred at the Malheur Wildlife Refuge.

- A second category seeks to **Grow the Pie**. What looks like a zero-sum game with only eight slices of pie to go around, morphs into a win-win scenario if suddenly the pie is enlarged with four more pieces to go around because the government pays off the losers. We generally see this approach where the potentially losing party is politically powerful. As J.B. Ruhl has documented, agricultural interests are more often paid to protect the environment than required to do so. Some fisheries facing restrictions have benefited from vessel buyback programs. The farmers and fishers may be losing, in the sense their actions are restricted, but at least they are being paid for the sacrifice. Similarly, the 1990 Clean Air Act (CAA)[13] Amendments explicitly sought to compensate coal mining communities for the expected losses in jobs digging high-sulfur Appalachian coal. Growing the pie can be a popular strategy for the parties involved, but not so attractive to taxpayers and those concerned over budget deficits. If regulation proves politically infeasible, however, then growing the pie may be palatable. Even here, though, the parties may not all be happy. Penn Central was certainly not content to receive tradable development rights for Grand Central Station in place of its lost air rights, nor do some environmental groups approve of paying farmers not to pollute.

- The third category presents the **Regulatory Flexibility** of growing the pie. Here, the losers are paid off through regulatory paths rather than through dollars. This is evident in the Clean Water Act's (CWA's)[14] §404 permit program for wetlands. On its face, the program seems to prohibit dredging and filling wetlands under a wide range of circumstances. In practice, wetlands mitigation banking acts as a political steam valve, allowing much development to proceed by compensating with constructed wetlands somewhere else. We see a similar dynamic with habitat conservation plans. Developers who would have perceived the lack of a permit as a zero-sum dynamic—local economic growth versus a wetland or endangered fly—instead see, if not a win-win dynamic, at least a situation where the costs of doing business are acceptable and the project goes forward. Like growing the pie, regulatory steam valves tend to be put in place when the losers are politically powerful and regulating them runs either legal or political risks.

None of these strategies is necessarily better than the other. The relative merits of There Should Be Losers, Grow the Pie, and Regulatory Flexibility will vary depending on the politics of the actors, the nature of the harm, and the public funds available. The key point is that zero-sum games need to pay special attention to the losers, whether they warrant compensation and, if so, what type of benefit is most appropriate.

IV. Deep Equity, Zero-Sum Environmentalism, and a Sustainable Planet

This section was authored by David Takacs, Professor of Law, UC Hastings College of Law.

As humans appropriate ever more of the planet's bounty, leaving less for nonhuman species and the ecosystems they inhabit, conflicts emerge over who or what gets which resources. Such skirmishes result in some of the unproductive zero-sum framings we too often see.

These zero-sum skirmishes extend to what are the appropriate frames through which to view the natural world, and thus how we set priorities to manage that world. Are ecosystems gardens to be cultivated and manipulated for human needs? Or are they wildernesses imbued with intrinsic value, whose species are valuable for their own sake, to be managed for continued ecological function and evolutionary potential?

In three of my research arenas, promoters of new conservation strategies split the difference, modulating between nature as sacred and nature as profane. In all cases, these three multifaceted approaches to solving problems serve as counter-narratives to win-lose, zero-sum environmentalism.

Public funders and private investors are pouring billions of dollars into Reducing Emissions from Deforestation and Forest Degradation (REDD+) in the developing world. In REDD+, investors pay people to preserve carbon in trees, and then sell credits based on the stored carbon to those who wish to offset their own greenhouse gas emissions. In biodiversity offsetting, rapidly gaining

13. 42 U.S.C. §§7401-7671q; ELR Stat. CAA §§101-618.
14. 3 U.S.C. §§1251-1387; ELR Stat. FWPCA §§101-607.

currency as a tool that (potentially) promotes prudent economic and ecological planning, developers degrade biodiversity in one place in exchange for paying to protect it elsewhere. And the South African government is managing water as ecological infrastructure in its attempt to fulfill the constitutionally guaranteed right to safe, clean drinking water. Focusing on the 8% of the nation's land that provides the source for 50% of its water, policymakers plan simultaneously to create more and cleaner water, augment local ecosystem services, protect nonhuman species, and create jobs for poor people in rural areas. Each of these examples presents nonzero-sum solutions to environmental problems and broadens the way we frame the problems in the first place.

Zero-sum framings do not mesh with an ecological worldview, which requires that we look at connections among multiple entities across time and space and reconsider the currencies by which "wins" and "losses" are tallied. In the three examples above, currencies (potentially) expand beyond immediate financial gain and loss to include local and global ecosystem services provided, greenhouse gases mitigated, aesthetic and biophilic benefits accrued, democratic decisionmaking participation rights enjoyed, human rights of present and future generations guaranteed, jobs created, and economies grown. This gives us a more expansive view of who might "win" when we implement novel approaches to environmental problems.

Before we throw the zero-sum paradigm out with the bathwater, we must acknowledge that underlying some zero-sum framing is the practical and ethical principle that someone does have to pay to effect environmental solutions, and someone should have to pay. For all the multiple winners in multiple currencies, some people do lose. In REDD+ (as its promoters portray it), northern nations (through their citizens and businesses) pay, and poor people and the biodiversity that sustains them win. In biodiversity offsetting, the developer (and those benefiting from new development) pay, and biodiversity (and people at the new offset site with new, enhanced ecosystems) may win. And in South Africa, the rich, major water consumers pay through cross tariffs and taxes (and wealthy landowners' property use may be restricted in various ways)—while poor people gain by acquiring subsidized, clean water. In all three, those who prize diverse ecosystems, the biodiversity those systems harbor, and the ecosystem services they provide win. But even those who do not explicitly prize these ecological assets nonetheless benefit from enhanced environmental amenities, albeit in more diffuse ways, harder to quantify by traditional zero-sum means.

I am implying here that some entities—the polluters, those who consume more than their fair share—should lose, at least by paying for their consumption and pollution, and others should gain. In international environmental law, the ethical principle of "common but differentiated responsibilities" (CBDR) compels all nations to steward the global commons, but requires wealthier nations to make greater contributions. As an emerging principle of customary international law, legal obligations stem from pragmatic reality rooted in ethical obligation. Pragmatically, only some nations have financial resources to mitigate environmental damage and help others adapt to environmental disruptions; ethically, those resources come from economies that developed without paying for environmentally destructive externalities. CBDR, applied to nations in the law, is also available as an ethical principle that underlies the drive to have wealthy individuals transfer some of that wealth to clean up environmental messes we have created from our overconsumption and overproduction. So, in the examples here, the carbon polluter, the ecosystem degrader, and the water glutton should pay so that those who suffer from greenhouse gas pollution, from ecosystem degradation, and from lack of clean water may benefit.

By taking a more multidimensional approach to environmental problem solving—by naming multiple winners and fewer losers, by highlighting ecological connections, and by trading in different currencies—each of these three efforts aims to be sustainable. They must be: (1) effective—they work for all stakeholders with little complication; (2) synergistic—they maximize benefits for local people and nonhuman entities; and (3) equitable—they narrow disparities between poor and rich. Specifically, to achieve sustainability over the duration of a nonzero-sum program, any environmental law should be implemented in a deeply equitable way.

By "deep equity," I refer to laws, policies, and values promoting sustainable pathways that act in synergy to maximize the health and potential of all individuals, communities, and ecosystems. The equity is "deep" because values become rooted within each individual, and because equity requires that we fundamentally re-imagine our community structures and responsibilities, and that we root these values and responsibilities in our legal systems and policy choices. Our laws and policies would, in turn, support values and actions promoting even deeper equity.

To make a deeply equitable world, we should abandon the dualisms of zero-sum environmentalism and expand both the currencies with which we calculate "winners and losers" and our notions of who the short- and long-term beneficiaries really are. While the devil always lies in the fine print of how programs are implemented in law and in practice, if done well, REDD+, biodiversity offsetting, and managing water as ecological infrastructure can all lead us away from dualistic zero-sum thinking about environmental problems and lead us to more holistic, equitable visions of a shared future on a sustainable planet. While that planet will continue to be a reservoir of ecological resources for humans to exploit to fulfill our needs and desires, it will also be one that stewards ecological function and the evolutionary process, and sustains the majestic, nonhuman world.

V. Beyond Zero-Sum Thinking for Environmental Law

This section was authored by Keith Hirokawa, Associate Professor of Law, Albany Law School.

The issue addressed here—zero-sum thinking and its application to environmental law—questions whether environmental quality is appropriately characterized as a zero-sum game in which regulation is an expensive, job-destroying monster.[15] Describing a choice as a zero-sum game can be insightful for understanding the architecture of choice in a battle of particular circumstances. The notion of the zero-sum game comes from game theory and describes an "I win, you lose" (or vice versa) situation in which the amount you lose is proportional to my gains in winning. The game provides insights into how particular resolutions may have been predictable or even beneficial under the circumstances.

However, when posed as a zero-sum game, environmental quality appears too costly: every dollar spent on the environment takes food from the table of some employee. Aside from the problem that the zero-sum characterization is seldom, if ever, an accurate description of environmental regulation, this zero-sum framing presumes that environmental values are somehow divorced from economic livelihoods.

Ecological economist Gretchen Daily defines "ecosystem services" as the "wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life."[16] In addition to the goods (food, timber, etc.) produced in the environment, functioning ecosystems supply essential services, including drinkable water and breathable air, biodiversity, habitable climate circumstances, and even spiritual and culturally significant experiences.[17] Of course, because the services provided by functioning ecosystems are often not exchanged in the marketplace, they have been routinely ignored and undervalued.[18] The study of ecosystem services illustrates the manner in which ecosystem processes have real value according to the benefits provided.[19]

The ecosystem services approach helps to overcome zero-sum rhetoric in at least three ways:

(1) **More and better information.** Valuing the environment as a provider of services recasts the problem of environmental degradation as one that can be calculated.[20] Viewing the environment as services also helps in identifying the types of information needed to solve environmental problems, such as baseline information on environmental function and the potential of conservation and resiliency planning to secure the continuing receipt of ecosystem benefits. By prioritizing this information, ecosystem services analysis helps to calculate the cost of losing ecosystem function by revealing the direct and indirect benefits people and communities receive from the environment.

(2) **Willingness to pay**. Ecosystem services requires an appraisal of ecosystem functionality. This approach helps explain why the interruption of ecosystem process (by transformation, degradation, or displacement) results in real losses to human well-being. Typically, our reliance on and need for particular ecosystem functions is undervalued until we experience changes in the environment. Once essential ecosystem services are diminished or lost, we understand their value as a cost of finding substitute services: clean water, clean air, water quality control facilities, and so on.[21] Likewise, information regarding the flow of ecosystem benefits provides an understanding of human well-being that identifies people as the beneficiaries of environmental quality and supports protection of ecosystem function as an investment that yields great returns.

(3) **Availability of win-win-win alternatives.** To see an alternative in which everyone wins is not to force an exception or search for an outlier. The winning alternative is almost always available and, when promoted as such, can be very persuasive. Recent examples include green building (which not only drives innovation and development, but produces healthier, longer lasting structures); renewable energy development (driving technological developments to produce cheaper, cleaner energy); and

15. As noted in the dissenting opinion to *Karuk Tribe of California v. U.S. Forest Service*, 681 F.3d 1006, 42 ELR 20116 (9th Cir. 2012) (Smith, J., dissenting), *cert. denied*, 2013 U.S. LEXIS 2256 (U.S., Mar. 18, 2013):
> a number of people will lose their jobs and the businesses that have invested in the equipment used will lose much of their value. . . . No legislature or regulatory agency would enact sweeping rules that create such economic chaos, shutter entire industries, and cause thousands of people to lose their jobs.

Id. (objecting to the U.S. Court of Appeals for the Ninth Circuit's decision to require §7 consultation under the ESA for Notice of Intent to operate mining operations in the Klamath River Basin).

16. Gretchen Daily et al., *Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems*, 2 Issues Ecology 1, 2 (1997); Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 Nature 253, 253 (1997); Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Synthesis, at v (2005).

17. U.S. EPA Science Advisory Board, *Valuing the Protection of Ecological Systems and Services* 8 (EPA-SAB-09-012) (May 2009), *available at* http://www.epa.gov/ecology/publications.htm.

18. James Salzman et al., *Protecting Ecosystem Services: Science, Economics, and Law*, 20 Stan. Envtl. L.J. 309, 311 (2001); Keith H. Hirokawa & Elizabeth J. Porter, *Aligning Regulation With the Informational Need: Ecosystem Services and the Next Generation of Environmental Law*, 46 Akron L. Rev. 963 (2013).

19. Costanza et al., *supra* note 16, at 253.

20. David Batker et al., *Gaining Ground—Wetlands, Hurricanes and the Economy: The Value of Restoring the Mississippi River Delta* 21 (2010), *available at* http://www.eartheconomics.org/FileLibrary/file/Reports/Louisiana/Earth_Economics_Report_on_the_Mississippi_River_Delta_compressed.pdf ("Ecosystem service valuation assigns a dollar value to goods and services provided by a given ecosystem. This allows for proposed management policies to be considered in terms of their ability to improve ecological processes that produce the full diversity of valuable ecosystem goods and services.").

21. Costanza et al., *supra* note 16, at 255.

> energy- and water-efficient products (products that demand fewer resources in design, construction, and operation). Better calculations of ecosystem services facilitate a conversation about cooperation, complementary values, and co-benefits, revealing that sound environmental choices do not result in "I win, you lose." For instance, an assessment of urban tree functions shows that trees in urban areas provide services (shade and climate control, water filtering, stormwater capture) that offer significant benefits at a minimal cost for installation and maintenance. In comparison, construction and maintenance of the grey infrastructure alternatives (A/C systems, water filtration plants, stormwater control facilities) are expensive to construct and maintain.

Zero-sum descriptions can be useful. However, they may also misdirect our attention in matters of environmental decisionmaking, and to that extent, thinking about environmental problems in zero-sum stories is short-sighted. Communities that investigate the alternatives created by ecosystem services have made efficient, valuable choices that will contribute to community well-being in significant ways. Watershed planning for water supply in New York City, urban forest planning in Charlotte, North Carolina, and wetlands planning in Portland, Oregon, have proven that ecosystems serve human well-being in essential ways. Win-win-win alternatives are found in functioning ecosystems. We only need to see ecosystems as opportunities.

VI. Zero-Sum Environmental Governance

This section was authored by Shannon Roesler, Professor of Law, Oklahoma City University School of Law.

The political climate that facilitated the passage of major pollution-control statutes, such as the CAA and the CWA, may seem difficult to imagine today. When the U.S. Congress passed the major pollution-control laws in the 1970s, it was responding to a growing consensus that federal environmental regulations were essential to protection of human health and the environment. In their absence, many feared that states would engage in a "race to the bottom," setting lax environmental regulations in an effort to attract industry and economic growth. Policymakers also recognized that environmental pollution increasingly presented problems of scale; pollutants emitted into the air and discharged into water bodies did not always remain within the political borders of a state. A federal role was perceived as a necessary means to ensure the efficient regulation of interstate pollution.

Today, political support for new environmental regulations at the federal level appears less uniform, particularly given the resistance to federal regulation by a sizeable number of states. Along with industry, states now routinely file lawsuits challenging new environmental regulations as abuses of federal power. Instead of thinking seriously about shared governance, the political default in many states is to litigate with the hope of invalidating the federal rule.

This turns environmental governance into a zero-sum jurisdictional game; if the federal rule is invalidated, the state wins, and if it stands, the state loses. When states treat environmental governance as a zero-sum game, they preclude the consideration of win-win scenarios. Along the way, time, effort, and money are wasted in protracted legal battles that delay important protections for human health and the environment.

Somewhat ironically, today's landscape of state-federal litigation takes place against a model of shared state-federal governance. Every student of federal pollution-control laws learns that they depend on a regulatory model often called "cooperative federalism." Under this model, the U.S. Environmental Protection Agency (EPA) uses its rulemaking authority to set minimum standards limiting the release of harmful pollutants into the environment, and state-level agencies typically implement and enforce these standards through permit processes. States also have some flexibility in deciding how to implement standards and meet other federal requirements. For example, under the CAA program that establishes ambient air quality standards for certain harmful pollutants, like carbon monoxide and ground-level ozone,[22] states draft their own state implementation plans for meeting these standards. State policymakers therefore have an opportunity to tailor their emission-control policies to fit their economic and social needs.

This model is theoretically "cooperative" because it depends on voluntary cooperation by state governments. States implement CAA and CWA permitting and enforcement because they prefer to have control over these processes, and often receive federal money and assistance in return. But if states opt out (or fail to meet the federal requirements), the federal government can step in and implement the regulatory program at issue, an arrangement often called conditional preemption.

Despite this cooperative model, the current litigation practices of some states tell an uncooperative—even hostile—story. Consider Texas. According to the *Texas Tribune*,[23] the state of Texas sued the Barack Obama Administration at least 48 times. In over one-half of these cases, Texas challenged EPA action regarding air and water quality standards. A sizeable subset of these lawsuits (eight) involves climate change regulation. The total bill for these challenges adds up to over $1.8 million.

Texas is not, of course, the only state to challenge federal environmental laws. Since EPA issued its Clean Power Plan (CPP) last year, more than one-half of the states, along with utilities, energy companies, and other industry and labor groups, have filed dozens of lawsuits alleging that EPA's plan for reducing carbon emissions from power

22. *See* U.S. EPA, *Criteria Air Pollutants*, *available at* https://www.epa.gov/criteria-air-pollutants.
23. *See* Neena Satija et al., *Texas v. the Feds—A Look at the Lawsuits*, Tex. Trib., Jan. 17, 2017, https://www.texastribune.org/2017/01/17/texas-federal-government-lawsuits/.

plants violates the CAA and unconstitutionally intrudes upon the states' authority to set energy policy.[24] (These suits are now part of consolidated litigation before the U.S. Court of Appeals for the District of Columbia (D.C.) Circuit.) The CPP sets emissions targets for each state, with the goal of achieving a 32% reduction from 2005 levels by 2030.[25] After the U.S. Supreme Court made the unusual decision to stay EPA's plan last spring, 19 states suspended their planning processes under the CPP, further delaying meaningful planning for emissions reductions and threatening to undermine U.S. compliance with the Paris climate change agreement.[26] Notably, states are divided on the issue; 18 states, along with various local governments, nonprofits, and industry groups, have filed briefs in support of the plan.[27]

Roughly as many states[28] also challenged EPA and the U.S. Army Corps of Engineers' (the Corps') 2015 Clean Water Rule, a regulation that seeks to clarify which water bodies and wetlands are covered by the CWA.[29] Supreme Court opinions regarding the relevant CWA language are splintered and leave many questions unanswered. In the Clean Water Rule, EPA and the Corps attempted to make their approach to CWA jurisdiction more predictable and transparent. But rather than waiting to see how the Clean Water Rule would function in practice, many states jumped to the zero-sum strategy: sue to invalidate. In litigation against both the Clean Water Rule and the CPP, states have argued that federal regulation unconstitutionally alters the state-federal balance of power by expanding federal regulatory power into areas traditionally regulated by the states.

Significantly, this zero-sum view of environmental governance is not confined to the offices of state attorneys general. Legislators in several states have introduced bills and resolutions that suspend state planning efforts under the CPP or characterize the plan as an abuse of federal power. For example, a resolution introduced in the Arizona Legislature calls on the state governor and attorney general to defend the state against "overreaching regulations."[30]

Some states may have valid objections to aspects of the CPP and the Clean Water Rule. The critical question, however, is whether a zero-sum litigation strategy is the best way to resolve these concerns. Consistent with the CAA's shared governance structure, the CPP recognizes that states will need time to develop emissions-reduction plans; it also allows states flexibility in how they meet their reduction targets and recognizes the role of interstate cooperation through regional trading plans. In the absence of comprehensive federal climate legislation, the CPP is at present the only realistic road toward meeting our national responsibility to reduce greenhouse gas emissions. Litigation is only delaying meaningful action.

Moreover, even if states "win" the jurisdictional battle, the victory will be costly. In addition to litigation costs, states may lose opportunities to shape national environmental policy and to mitigate costly environmental and public health risks. As the "cooperative" ideal of environmental federalism recognizes, environmental regulation should not be a zero-sum game.

Of course, the nature of cooperative (or competitive) federalism shifts with each administration's regulatory agenda. President Trump chose Oklahoma Attorney General Scott Pruitt as his EPA Administrator, a choice the U.S. Senate recently confirmed. As reported in the *New York Times* and elsewhere, Pruitt has helped lead the coalition of Republican attorneys general in their zero-sum litigation of federal environmental regulations, including the CPP.[31] After serving as EPA Administrator for just over two weeks, he publicly questioned the scientific consensus that emissions of greenhouse gases are "a primary contributor" to global warming.[32] In addition, President Trump has already directed EPA to begin the long process of rewriting the Clean Water Rule, and he is expected to sign an executive order regarding the CPP.[33] Pruitt will oversee administrative efforts to dismantle these and other regulations.

We may soon see some states play a very different role: one designed to defend EPA and cooperative federalism. States that acted early to curb carbon emissions, for example, are likely to oppose federal efforts to reconsider regulations and climate policies. But these kinds of court challenges are not examples of zero-sum strategies. Instead, they are efforts to preserve the basic architecture of environmental law, a structure that promotes jurisdictional pluralism without jeopardizing minimum standards and international commitments.

24. *See E&E's Power Plan Hub*, E&E News, http://www.eenews.net/interactive/clean_power_plan.
25. Carbon Pollution Emission Guidelines for Existing Sources, Electric Utility Generating Units, 80 Fed. Reg. 64661 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).
26. *See E&E's Power Plan Hub*, *Supreme Court Stay Response*, E&E News, http://www.eenews.net/interactive/clean_power_plan#planning_status_chart.
27. *See Clean Power Plan in the Courts, Battle Lines*, E&E News, http://www.eenews.net/interactive/clean_power_plan/fact_sheets/legal_battle_lines.
28. *See* Timothy Cama, *27 States Challenge Obama Water Rule in Court*, The Hill, June 30, 2015, http://thehill.com/policy/energy-environment/246539-27-states-challenge-obama-water-rule-in-court.
29. Clean Water Rule, Definition of "Waters of the United States," 80 Fed. Reg. 37053 (June 29, 2015).
30. *See* Nat'l Conference of State Legislatures, *States' Reactions to EPA Greenhouse Gas Emissions Standards*, Apr. 18, 2016, *available at* http://www.ncsl.org/research/energy/states-reactions-to-proposed-epa-greenhouse-gas-emissions-standards635333237.aspx.
31. *See* Coral Davenport & Eric Lipton, *Trump Picks Scott Pruitt, Climate Change Denialist, to Lead EPA*, N.Y. Times (Dec. 7, 2016), https://www.nytimes.com/2016/12/07/us/politics/scott-pruitt-epa-trump.html?_r=0.
32. *See* Coral Davenport, *EPA Chief Doubts Consensus View of Climate Change*, N.Y. Times (Mar. 9, 2017), https://www.nytimes.com/2017/03/09/us/politics/epa-scott-pruitt-global-warming.html.
33. *See* Coral Davenport, *Trump Order Will Aim to Roll Back a Clean Water Rule*, N.Y. Times (Feb. 27, 2017), https://www.nytimes.com/2017/02/27/us/politics/trump-clean-water-epa.html.

VII. Zero-Sum Games in Pollution Control: The Games We Create Versus the Games We Discover

This section was authored by Robin Kundis Craig, James I. Farr Presidential Endowed Professor of Law, University of Utah S.J. Quinney College of Law.

Environmental pollution lands us in zero-sum games.[34] The more interesting question is: Do we *discover* these games? Or do we *invent* them? In other words, are there hard environmental limits on how much anthropogenic pollution natural systems can absorb, which we eventually discover? Or do we create zero-sum games for pollution purely because of our own goals for both ecosystems and SESs (a recognition that human societies are both part of and depend upon functioning ecosystems)? In fact, we do both, and the intersection of the two in a climate-change era is worth examination.

There is no doubt that natural systems respond to, and can be altered by, human pollution, and at all sorts of scales. The emerging discipline of resilience theory posits that ecosystems can exist in alternative stable states and that they transform from one state to another by crossing an *ecological threshold*.[35] While resilience theory imposes no normative value on these alternative states,[36] as a pragmatic matter, humans tend to find one state more desirable than the others. Relatedly, and importantly, crossing an ecological threshold in one direction is often easier than reversing the process. Thus, when ecosystems are in human-desired states, keeping that system from crossing an ecological threshold in the first place is often far less costly than trying to restore the ecosystem afterward. Thus, identifying ecological thresholds and the most desirable of alternative states can help to inform legal and policy goals.

Pollution often prompts one of the most common ecological transformations—namely, the eutrophication of water bodies as a result of excess nutrient (nitrogen and phosphorus) pollution.[37] Eutrophication transforms aquatic ecosystems from clear, oxygenated, and often cooler waters that can support a variety of plant and animal species to ecosystems dominated by algae, hypoxic (low-oxygen), or anoxic (no-oxygen) warmer water, with greatly reduced biodiversity.[38] Moreover, once an aquatic system has become eutrophic, restoring it to its previous and often more productive ecosystem state can be very difficult.[39]

Thus, eutrophication thresholds could be considered to define a zero-sum pollution game that we have *discovered*. Specifically, if we are pursuing a normative goal of keeping an aquatic system in its non-eutrophic state (which is, in fact, what people usually want), the aquatic system's capacity to absorb nutrients without transforming defines a limited pollution "pie" for achieving that governance goal. If polluters have reached this capacity, no polluter can increase its nutrient pollution without either another polluter having to reduce its pollution *or* the system transforming.

The entire planet may also be limited in how much pollution of various sorts it can absorb without transforming into—well, something radically different than the planet we and our hominid relatives have enjoyed for the last 12,000 years during the Holocene. In *Big World, Small Planet: Abundance Within Planetary Boundaries*, Johan Rockström and Mattias Klum describe the Planetary Boundaries Project.[40] This project is the effort of a team of scientists to identify key planetary boundaries—parameters that, if exceeded, risk transforming the entire Earth and its ecosystems.[41] In its 2014 update to the original 2009 research, the team identified nine such planetary boundaries.[42] Three of these—the "Big Three"—reflect "processes with sharply defined global thresholds" that are "hard-wired into the Earth system and cannot be shifted by human actions," processes that "are capable of sharp shifts from one state to another, with direct implications for the entire planet."[43]

These Big Three planetary boundaries are climate change, stratospheric ozone depletion, and ocean acidification.[44] Notably, the planet is at risk of crossing all three of these boundaries because of human pollution—respectively, greenhouse gases, ozone-depleting chemicals, and anthropogenic carbon dioxide.[45] In addition, the risks of exceeding three other planetary boundaries—biochemical flows (nutrient cycles), atmospheric aerosol loading, and novel entities (toxics)—are directly related to anthropogenic pollution, with the scientists concluding in 2014 that we are already at high risk of exceeding the phosphorus and nitrogen limits.[46] (The other three planetary boundaries are biodiversity, freshwater consumption, and land use change.)[47]

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34. John von Neumann and Oskar Morgenstern developed the concept of zero-sum games as part of their invention of game theory. Thomas S. Ferguson, Game Theory II-4 (UCLA Department of Mathematics 2011). In game theory, a zero-sum game is one in which no wealth is created or destroyed; one person's gain must result in another person's (or persons') loss to the same amount or degree. *Id.* More colloquially, zero-sum games can be viewed as problems where there is a single unchanging "pie" of resources and several people are seeking to increase the size of their slice; they can only do so by decreasing the amount of pie available to everyone else.
35. Lance H. Gunderson & Crawford S. Holling, Panarchy: Understanding Transformations in Human and Natural Systems 34 (2001).
36. Brian Walker & David Salt, Resilience Thinking: Sustaining Ecosystems and People in a Changing World 7-9 (2006).
37. Ocean Service Education, *Nutrient Pollution—Eutrophication*, NOAA, http://oceanservice.noaa.gov/education/kits/estuaries/media/supp_estuar09b_eutro.html (revised Mar. 25, 2008).
38. *Id.*
39. Stephen R. Carpenter, *Eutrophication of Aquatic Systems: Bistability and Soil Phosphorus*, 102, No. 29 Proceedings of the National Academy of Sciences (PNAS) 10002-05 (July 19, 2005), *available at* http://www.pnas.org/content/102/29/10002.full.pdf.
40. Johan Rockström & Mattias Klum, Big World, Small Planet: Abundance Within Planetary Boundaries 64-77 (2015).
41. *Id.* at 64.
42. *Id.* at 65 fig. 2.1.
43. *Id.* at 69.
44. *Id.*
45. *Id.* at 65 fig. 2.1.
46. *Id.*
47. *Id.*

One way of interpreting the results of the Planetary Boundaries Project, therefore, is that we have discovered that much pollution is, ultimately, a zero-sum game at the planetary scale—at least if we want to avoid transforming the Earth into a very different state of being, one that is probably far less hospitable to the current forms of life existing here (including us). There is decent evidence that *if* people and governments believe and appreciate the systemic risks from pollution, they eventually will act (at least so far as the capacity to act exists) to reduce those risks, particularly if they can do so relatively cheaply and easily.

For example, scientists discovered a recurring hole in the atmospheric ozone layer in 1984 and published their results in *Nature* in May 1985.[48] By September 1987, the world's nations had agreed to the Montreal Protocol on Substances That Deplete the Ozone Layer, a treaty that phased out the production and consumption of many ozone-depleting chemicals.[49] In June 2016, scientists reported that the ozone hole is starting to "heal."[50] Thus, stratospheric ozone depletion is one pollution-related planetary boundary from which the world appears to be retreating.

However, not all zero-sum pollution games result from "discovered" natural limits of ecological thresholds and planetary boundaries. Instead, some of these games reflect human regulatory choices about the environmental quality that we desire. For example, the United States and Canada noticed acid rain problems in the 1960s and 1970s.[51] Acid rain was clearly affecting ecosystems such as maple forests and lakes in both countries[52]; whether it was driving them toward ecological thresholds and transformations is a far more open question.

Nevertheless, in 1990, Congress amended the CAA to impose a comprehensive "cap-and-trade" program for sulfur dioxide and nitrogen oxides, effectively creating a regulatory zero-sum game for emissions of these pollutants.[53] In 1991, Canada and the United States entered into a treaty to address acid rain, effectively extending the cap-and-trade concept across national boundaries.[54] Cap-and-trade programs are regulatory zero-sum games: The "cap" sets the total amount of pollution allowed (the "pie"), while the trading reflects the fact that one polluter's need to emit beyond its assigned allowance must be matched by another polluter's (or polluters') willingness to reduce its (their) emissions below those allowances.[55]

Water pollution in the United States is also subject to regulatory zero-sum games, in the form of the CWA's total maximum daily load (TMDL) requirements.[56] The TMDL is the total amount of a pollutant that a water body can take in on a daily basis without violating its state-defined water quality standards.[57] These water quality standards reflect both the uses of the water body that were present in 1972 and the state's as-yet-unattained use goals for that water body, with a general national goal that all water bodies should be fishable and swimmable.[58] Thus, with few exceptions, states do not set water quality standards to reflect actual ecological thresholds, but rather the uses that exist or can be restored within the current system state.[59]

As such, water quality standards and the TMDLs that result from them are not "discovered" zero-sum pollution games. Instead, TMDLs, like cap-and-trade programs, are regulatory zero-sum games created to achieve human-defined pollution reduction goals. The total amount of pollutant allowed under the TMDL is divided among natural background sources and human sources of the pollutant, requiring human sources that exceed their assigned allowance to reduce their pollutant contribution levels.[60] EPA and the states are also beginning to experiment with water quality trading for certain pollutants,[61] providing a market-based method for polluters to adjust their individual pollution levels under the TMDL—but the market only works *because* the TMDL creates a legal zero-sum pollution game.

In the absence of clearly stated environmental quality goals—national ambient air quality standards under the CAA,[62] water quality standards under the CWA[63]—and a regulatory program for achieving them, humans tend to operate as if pollution is *not* a zero-sum game right up until the point where they push a system across a threshold or boundary. As a result, ambient environmental quality goals and *regulatory* zero-sum games—the zero-sum pollution games that we invent—can keep us from having to discover that pollution is a zero-sum game at a larger scale (at least to the extent that we want to avoid ecosystem and planetary transformations). Moreover, given that it is often hard to fight our way back when we hit those limits—it has taken almost three decades for the ozone hole to begin

48. Joseph C. Farman et al., *Large Losses of Total Ozone in Antarctica Reveal Seasonal ClO_x/NO_x Interaction*, 315 Nature 207-10 (1985).
49. United Nations, *International Day for the Preservation of the Ozone Layer: 16 September*, http://www.un.org/en/events/ozoneday/background.shtml (last visited Jan. 25, 2017).
50. Aaron Sidder, *Remember the Ozone Hole? Now There's Proof That It's Healing*, Nat'l Geographic (June 30, 2016), *available at* http://news.nationalgeographic.com/2016/06/antarctic-ozone-hole-healing-fingerprints/.
51. Gene E. Likens & Richard T. Holmes, *The Discovery of Acid Rain*, Yale Books Unbound (May 4, 2016), http://blog.yupnet.org/2016/05/04/discovery-acid-rain/ (May 4, 2016).
52. *Id.*
53. Pub. L. No. 101-549, Title IV, 104 Stat. 2584 (Nov. 15, 1990).
54. Environment and Climate Change Canada, *Canada-United States Air Quality Agreement*, Government of Canada, https://www.ec.gc.ca/air/default.asp?lang=En&n=83930AC3-1 (as viewed Jan. 26, 2017). The treaty itself is available at http://www.ijc.org/rel/agree/air.html.
55. Rosaly Byrd & Laurèn Demates, *An Introduction to Cap-and-Trade Systems Around the World*, Huffington Post (Feb. 24, 2016), http://www.huffingtonpost.com/rosaly-byrd/an-introduction-to-carbon-cap-and-trade_b_6737660.html.
56. 33 U.S.C. §1313(d).
57. U.S. EPA, *Implementing Clean Water Act Section 303(d): Impaired Waters and Total Maximum Daily Loads (TMDLs)*, https://www.epa.gov/tmdl (last updated Sept. 21, 2016).
58. 33 U.S.C. §1313(c); 40 C.F.R. §131.3(i).
59. *See What Are Water Quality Standards?*, U.S. EPA, https://www.epa.gov/standards-water-body-health/what-are-water-quality-standards (last updated Nov. 3, 2016) (describing how states set water quality standards).
60. 40 C.F.R. §130.2(i).
61. *Frequently Asked Questions About Water Quality Trading*, U.S. EPA, https://www.epa.gov/npdes/frequently-asked-questions-about-water-quality-trading (last updated July 8, 2016).
62. 42 U.S.C. §7409.
63. 33 U.S.C. §1313(c).

to respond to the Montreal Protocol, and many eutrophic water bodies remain transformed—the concepts of ecological thresholds and planetary boundaries suggest that defining *more* regulatory zero-sum pollution games might help us to define and stay within safe operating spaces for human activity (assuming our science is good enough to identify those boundaries and thresholds accurately).

Of course, the elephant in the room is climate change. Is climate change a zero-sum pollution game? The many debates over the "proper" target for atmospheric greenhouse gas concentrations (350 parts per million of carbon dioxide, or 400, or 450) suggests that both climate change scientists and climate change activists perceive climate change to be zero-sum.[64] Moreover, the politics of climate change mitigation negotiations are clearly driven by perceptions that parceling out emissions reduction commitments and total emissions limits creates winners and losers—people who get more or less than their fair shares of a limited emissions "pie."[65]

But climate change, as usual, is more complex than just the mitigation zero-sum game. The Planetary Boundaries Project scientists consider climate one of two "core" boundaries (biodiversity is the other), because the climate system has "a decisive role, on [its] own, in determining the outcome of the planetary state."[66] With respect to pollution, if the world refuses to acknowledge and play the climate change mitigation zero-sum game, the parameters of many of the other zero-sum pollution games are likely to change on us, calling into question the continued viability of the zero-sum pollution games we have created.

Many forms of pollution are sensitive to temperature,[67] for example, and climate change may make many of the environmental quality goals that bound regulatory zero-sum games impossible to achieve—for example, ground-level ozone goals,[68] water temperature goals,[69] ocean pH goals.[70] Thus, climate change impacts push many ecosystems, and perhaps the planet as a whole, toward transformation, and it is important to remember that the zero-sum pollution games we invent are, ultimately, dependent on the zero-sum pollution games we discover.

VIII. Making Economic Development and Job Creation Drivers of Serious Action on Climate Change and Environmental Protection

This section was authored by John C. Dernbach, Commonwealth Professor of Environmental Law and Sustainability and director of the Environmental Law and Sustainability Center at Widener University Commonwealth Law School.

> We're fighting for policy changes that will make it possible for us to have better choices; utilities that offer us renewable options, electric trains that make short-haul flights obsolete, public transit. Exxon and its ilk have been fighting for decades to keep these choices out of our reach, and then claim that we are voting with our dollars every time we sit in traffic or heat our homes with fossil fuels supplied by a utility that has a monopoly. They can play gotcha as much as they want, but all it proves is how badly we need better options.[71]
>
> —Bill McKibben

One of the most long-standing narratives in environmental law and politics is the alleged necessity of choosing between development and environment. The narrative persists in industrial projects, dams, mines, shale-gas development, highways, construction projects, and in a variety of other projects and activities. As Bill McKibben points out in the quote above, it also persists in the debate about what to do about climate change. In every case, some people win, and some people lose. The narrative, based on conventional development, has a built-in zero-sum game—development *or* environment.

A competing narrative, which has been slowly gaining supporters over several decades, is built on the idea of sustainable development—development *and* environment. When there are attractive ways of making environmental protection and economic development mutually reinforcing, there is a way of escaping the zero-sum framing of environmental issues, including climate change. As McKibben says, people want better choices.

The conflict between these narratives goes to the heart of the divide on environmental policy between the national Republican Party (which tends to embrace conventional development and tends to see environmental programs as a diminution of national wealth) and the national Democratic Party (which, without a lot of fanfare, has tended to embrace sustainable development). As of this writing, it appears that newly elected President Trump has begun, in the name of conventional development, to wreck much

64. Arthur Neslen, *Carbon Dioxide Levels in Atmosphere Forecast to Shatter Milestone*, The Guardian (June 13, 2016, 11:41 PM), https://www.theguardian.com/environment/2016/jun/13/carbon-dioxide-levels-in-atmosphere-forecast-to-shatter-milestone (discussing the 400 ppm and 450 ppm thresholds, noting that the Intergovernmental Panel on Climate Change has settled on the latter); 350.org, *The Science*, *available at* https://350.org/about/science/ (as viewed Jan. 25, 2017) (document its and Dr. James Hansen's commitment to 350 ppm as a goal).

65. Most famously, the Kyoto Protocol to the United Nations Framework Convention on Climate Change sought to impose greenhouse gas emissions reduction targets on developed nations. United Nations, *United Nations Framework Convention on Climate Change: Kyoto Protocol*, *available at* http://unfccc.int/kyoto_protocol/items/2830.php (as viewed Jan. 25, 2017).

66. Rockström & Klum, *supra* note 40, at 71.

67. Daniel J. Jacob & Darrell A. Winner, *Effect of Climate Change on Air Quality*, 43 Atmospheric Env't 51, 54-55 (2009).

68. *Id.* at 60.

69. Robin Kundis Craig, *Climate Change Comes to the Clean Water Act: Now What?*, 1 Wash. & Lee J. Energy, Climate, & Env't 9, 12, 19-20 (Spring 2010).

70. Robin Kundis Craig, *Dealing With Ocean Acidification: The Problem, the Clean Water Act, and State and Regional Approaches*, 90 Wash. L. Rev. 1583, 1612-27 (Dec. 2015).

71. Bill McKibben, *Embarrassing Photos of Me, Thanks to My Right-Wing Stalkers*, N.Y. Times, Aug. 5, 2016, *available at* http://www.nytimes.com/2016/08/07/opinion/sunday/embarrassing-photos-of-me-thanks-to-my-right-wing-stalkers.html?_r=0.

of the climate change and environmental law and policy that the Obama Administration built on sustainable development grounds. In the name of economic development and job creation for fossil fuels, President Trump appears to be willing to destroy or weaken programs that build the economy and create the very jobs that he envisions for the renewed America. The real choice, then, is not between development and the environment. The real choice is between conventional development and sustainable development.

The economic and job creation benefits of action on climate change, for example, can be enormous. The rapidly growing attractiveness of increased energy productivity (which measures the economic value created per unit of energy used) and renewable energy illustrate the point. Almost 900,000 workers spend more than one-half their time doing energy efficiency work. Energy efficiency companies expect that an additional 245,000 jobs will be created over the next year.[72] Energy productivity also does something that fossil fuels can no longer consistently do; it saves people money. Doubling energy productivity would save the U.S. economy $327 billion annually after subtracting investment costs, and generate 1.3 million new jobs.[73]

Renewable energy has reached grid parity in nearly the entire country, according to the U.S. Energy Information Administration[74] as well as two investment banks, Lazard[75] and Deutsche Bank.[76] That is, the life-cycle cost of electricity from wind and solar is at or below the cost of electricity from coal, nuclear, and gas, even without subsidies. As a result, jobs in wind and solar are growing rapidly. The total number of solar energy jobs (373,807) is more than twice the total number from mining and electrical generation from coal (160,119), and slightly more than the total from extraction and electrical generation from natural gas (362,118).[77] Another 101,738 persons work in the wind industry.[78] In 2016, employment in the solar and wind industries grew by 25% percent and 32%, respectively.[79] These figures do not include the considerable benefits to the United States of global action on climate change[80] or the enormous costs of not acting.[81]

If properly and forcefully advocated and understood, economics and job creation could change the narrative of development or environment that the Trump Administration appears to embrace. Environmental protection and climate change were not major issues in the 2016 election, and the political truth may be that the electorate is interested in economic development and job creation no matter what the source of, or driving force for, these jobs. Thus, economic development and job creation need to be understood as drivers for action on climate change and environmental protection, and not simply forces to be blunted. Economic development, in fact, has been a principal reason for many of the environmental protection laws that have been adopted in the United States over the last several decades—including those for renewable energy, energy efficiency, recycling, and organic food.[82] Making economic development and job creation a driver for serious action on climate change and environmental protection, of course, subverts the conventional development model.

The conventional development model on which the first narrative builds has had large global consequences, both positive and negative. It can be described like this:

Conventional Development

Progress	Price of Progress
• Peace and security • Economic development • Social development/ human rights/healthy communities	• Environment and natural resources • Living people who depend on environment and natural resources who are harmed (health, property, etc.) • Future generations that are harmed

Conventional development, or simply development, is built on the idea of maximizing peace and security as well as economic and social development. It was given considerable impetus by a variety of treaties and international institutions created at the end of World War II, and is directed at improving human freedom, opportunity, and quality of life.[83] The model has worked in many ways; there has not been a third world war; the global economy has grown considerably; and people are living longer, tend to be healthier, and are better educated. Most of us would call that progress.

72. Environmental Entrepreneurs (E2) & E4TheFuture, Energy Efficiency Jobs in America: A Comprehensive Analysis of Energy Efficiency Employment Across All 50 States 4 (2016), *available at* https://www.e2.org/wp-content/uploads/2016/12/EnergyEfficiencyJobsInAmerica_FINAL.pdf.
73. Alliance to Save Energy, American Energy Productivity: The Economic, Environmental, and Security Benefits of Unlocking Energy Efficiency 9-10, 13-14 (2013), *available at* http://www.ase.org/sites/ase.org/files/rhg_americanenergyproductivity_0.pdf.
74. U.S. Energy Information Administration, Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2016 at 6 (2016), *available at* http://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf.
75. Lazard, Lazard's Levelized Cost of Energy Analysis—Version 9.0 at 2 (2015), *available at* https://www.lazard.com/media/2390/lazards-levelized-cost-of-energy-analysis-90.pdf.
76. Deutsche Bank Markets Research, Industry: Solar 78-79 (2015), *available at* https://www.db.com/cr/en/docs/solar_report_full_length.pdf.
77. U.S. Dep't of Energy, U.S. Energy and Employment Report 29 (2017), *available at* https://www.energy.gov/sites/prod/files/2016/03/f30/U.S.%20Energy%20and%20Employment%20Report.pdf.
78. *Id.*
79. *Id.* at 8.
80. U.S. Environmental Protection Agency, Climate Change in the United States: Benefits of Global Action (2015), *available at* https://www.epa.gov/sites/production/files/2015-06/documents/cirareport.pdf.
81. Marshall Burke et al., *Global Non-Linear Effect of Temperature on Economic Production*, 527 Nature 235 (2015) (concluding that unmitigated warming is likely to reduce average global incomes by 23% by 2100).
82. John C. Dernbach, *Creating the Law of Environmentally Sustainable Economic Development*, 28 Pace Envtl. L. Rev. 614 (2011).
83. John C. Dernbach & Federico Cheever, *Sustainable Development and Its Discontents*, 4 Transnat'l Envtl. L. 247, 256-61 (2015); John C. Dernbach, *Sustainable Development as a Framework for National Governance*, 49 Case W. Res. L. Rev. 1, 8-32 (1998).

But the model comes with a price, and it begins (but does not end) with widespread and growing environmental degradation, including climate disruption. Simply put, the model is based on an approach to decisionmaking that treats the environment as secondary in importance or as an afterthought. If it were just about the environment alone, that would be bad enough. But nearly all damage to the environment also hurts other humans in some way, sooner or later—through air or water pollution, disrupted communities, and the many ways in which a changing climate is already making life harder and more expensive. And many of the people who will be harmed have not yet been born.

Conventional development, then, comes with a built-in trade off. It can only be justified in utilitarian terms; in environmental and human rights terms, conventional development asks too much. By benefiting some people at the expense of others, conventional development is also inequitable. The utilitarian calculus, moreover, only works if the benefits outweigh the costs, and many of the environmental and human costs are not, or cannot be, calculated. Finally, any system with such substantial built-in costs is an inefficient way of improving overall human well-being.

The basic idea behind *sustainable* development is to transform development, not simply to relabel it—to move from "development *or* environment" to "development *and* environment."

Sustainable development can be depicted as follows:

Sustainable Development

Progress
• Peace and security
• Economic development
• Social development/ human rights/healthy communities
• Environment and natural resources protection and restoration

Essentially, sustainable development moves environment and natural resources from the "price of progress" column into the "progress" column. Because the adverse effects of environmental degradation tend to disappear as a result, there is no need for the "price of progress" column. Sustainable development is also directed at human freedom, opportunity, and quality of life, but places greater emphasis on future generations.

In any given *sustainable* development context, from specific projects or activities to national plans and policies, decisionmakers are to integrate environmental considerations and goals into the decisions they make. Sustainable development provides a framework for creating new approaches that produce both environmental and development benefits, and encourages a more aggressive use of legal and policy tools that had been often considered of marginal value. Energy-efficiency standards adopted or strengthened in the United States since 2009 for appliances such as clothes washers and air conditioners, for instance, are projected to save consumers more than $540 billion by 2030.[84] U.S. government-funded research and development—another tool that is often overlooked—has played a substantial role in reducing solar energy costs and thus increasing global demand for solar energy.[85] Both of these advance equity because they reduce the amount of money that people, especially poor and low-income people, need to spend on energy. Sustainable development thus provides a way for public and private decisionmakers in all countries to get past the apparent conflict between development and environment.

These new approaches are increasingly evident in a variety of contexts, including business and industry, higher education, local governance and sustainability, and brownfields redevelopment,[86] but progress thus far has been slow and uneven.[87] Where progress has occurred, a key factor is that sustainable development generally produces greater net benefits than conventional development. These benefits include higher quality of life, reduced costs, and economic development.[88] The sustainable development framework can also generate a variety of economic, social, and environmental benefits; not just one type of benefit (primarily economic).

In addition, the total economic, social, and environmental outcomes of a project or activity animated by sustainability are likely to be greater than they would be if these outcomes offset each other in major ways (e.g., when the economic development benefits of a project or activity are offset to some degree by its environmental and human costs). For all the benefits that coal has brought to the national economy over two centuries, for example, air pollution from coal fired-power plants (sulfur dioxide, nitrous oxide, and particulates) caused $62 billion in public health damage and significant premature human mortality in 2007, even after more than three decades of air pollution control.[89]

The critical point, in other words, is that sustainable development can produce greater net economic benefits than conventional development, and can also provide a range of social and environmental benefits. These benefits, as McKibben points out, include choices that people want, like renewable energy and public transit. Sustainable development also provides a more politically compelling frame for justifying serious action on climate change than perhaps any other possible frame. For more than two decades,

84. U.S. Department of Energy, Saving Energy and Money With Appliance and Equipment Standards in the United States (2016), *available at* http://energy.gov/sites/prod/files/2016/02/f29/Appliance%20Standards%20Fact%20Sheet%20-%202-17-2016.pdf.
85. The White House, United States Mid-Century Strategy for Deep Decarbonization 35 (2016), *available at* http://unfccc.int/files/focus/long-term_strategies/application/pdf/us_mid_century_strategy.pdf.
86. John C. Dernbach et al., *Progress Toward Sustainability: A Report Card*, *in* Agenda for a Sustainable America 16 (Dernbach ed. 2009).
87. John C. Dernbach et al., Acting as if Tomorrow Matters: Accelerating the Transition to Sustainability 9 (2012).
88. *Id.* at 289-90.
89. Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption & National Research Council, Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use 6, 340 (2010).

both red and blue states have taken action to address climate change, primarily by fostering energy efficiency and renewable energy, through a variety of different legal tools, and they have done so primarily for economic development, job creation, technological innovation, and social equity reasons.[90] Similarly, the Obama Administration and others have justified action on climate change on economic development and job creation grounds.[91] Profs. Hari Osofsky and Jacqueline Peel have synthesized a large body of psychological research and concluded that refocusing climate change efforts on economic development and disaster resilience is likely to provide a way of getting past partisan divisions on energy and climate change in many contexts.[92]

This approach is not a panacea; advocates of fossil fuels tend not to be interested in economic development in a broad sense; they are interested in economic development based on fossil fuels. Still, focusing on economic development and job creation from energy productivity and renewable energy has a decent record of success. If we are to avoid the worst effects of climate change and protect the environment, we must use the sustainable development framework to give a higher priority to economic development and job creation—starting now.

IX. Energy Policy: No Place for Zero-Sum Thinking

This section was authored by Inara Scott, Assistant Professor, College of Business, Oregon State University.

The popular notion of a zero-sum game is a scenario in which, for one party to gain value, another party must lose it. We can imagine a pie cut into six pieces, with six people standing beside it. For any one individual to get two pieces means someone else must go hungry. One of the key assumptions here, of course, is that the number of slices of pie is fixed. We cannot add to the pie.

Any simplistic metaphor is certain to break down under scrutiny, but in the energy context, this image is particularly inapt. In December 2005, natural gas was trading around $15.39 per million British thermal units. Today, the price is closer to $2.90.[93] The reason for this precipitous drop? New techniques in fracking and horizontal drilling in shale rock, which allowed developers to shake loose massive stores of natural gas that had previously been inaccessible. The pie suddenly got a whole lot bigger.

Improvements in materials and efficiency have also drastically lowered the cost of renewable energy generation—so much so that current cost projections for 2020 are *half* what they were about a decade ago. The cost of wind energy alone fell almost 60% from 2009-2015.[94] If we think of the pie as the amount of renewable energy we can generate per dollar, there can be no doubt it continues to grow.

Unfortunately, in the energy context, the pie can also shrink. The same shale gas that grew the natural gas pie could soon dry up, for regulatory or safety reasons. Fracking has been associated with an increase in earthquake activity.[95] The controversial technique also uses significant amounts of groundwater (a touchy subject in drought-stricken areas, including California)[96] and can contaminate groundwater with its dangerous mixture of chemicals.[97] While some seek to close loopholes and regulate fracking at the federal level,[98] states like New York have banned the practice entirely, citing significant health and safety concerns.[99]

Rather than use a metaphor like the zero-sum game, some prefer shorthand like "winners and losers" to emphasize that, in the environmental context, choices inevitably have both positive and negative consequences. For example, in fragile desert ecosystems, massive solar towers that concentrate heat and produce clean energy have also resulted in bird deaths and converted habitat for giant tortoises.[100] So, for the solar tower to be the winner, we have presumably got to accept that the tortoise will be the loser. In coal country, the story goes, the coal miner is the "loser" and the environment is the "winner," never mind that it was largely the low cost of natural gas and renewables,[101] not environmental regulation, that put the miner out of a job and created record levels of unemployment and poverty in his community.[102]

90. John Dernbach and the Widener University Law School Seminar on Global Warming, *Moving the Climate Debate From Models to Proposed Legislation: Lessons From State Experience*, 30 ELR 10933 (Nov. 2000).
91. Hari M. Osofsky & Jacqueline Peel, *Energy Partisanship*, 65 Emory L.J. 695, 726-29 (2016).
92. *See id.*
93. *Natural Gas*, Trading Economics, http://www.tradingeconomics.com/commodity/natural-gas (last visited Sept. 12, 2016).
94. Scott Nyquist, *Lower Oil Prices but More Renewables: What's Going On?*, McKinsey & Company (June 2015), http://www.mckinsey.com/industries/oil-and-gas/our-insights/lower-oil-prices-but-more-renewables-whats-going-on.
95. For a variety of data and information, see U.S. Geological Survey, *Induced Earthquakes*, http://earthquake.usgs.gov/research/induced/ (last visited Sept. 12, 2016).
96. Bobby Magill, *Water Use Rises as Fracking Expands*, Sci. Am. (July 1, 2015), http://www.scientificamerican.com/article/water-use-rises-as-fracking-expands/.
97. Gayathri Vaidyanathan, *Fracking Can Contaminate Drinking Water*, Sci. Am. (Apr. 4, 2016), *available at* http://www.scientificamerican.com/article/fracking-can-contaminate-drinking-water/.
98. A recent decision by the U.S. District Court for Wyoming ruled that BLM did not have the authority to regulate fracking. *BLM Fracking Decision Is Narrow, but With a Vast Impact*, Law360 (July 1, 2016, 11:06 AM), http://www.law360.com/articles/812000/blm-fracking-decision-is-narrow-but-with-a-vast-impact.
99. Freeman Klopott, *N.Y. Officially Bans Fracking With Release of Seven-Year Study*, Bloomberg (June 29, 2015), http://www.bloomberg.com/news/articles/2015-06-29/n-y-officially-bans-fracking-with-release-of-seven-year-study.
100. Union of Concerned Scientists, *Concentrating Solar Power Plants*, *available at* http://www.ucsusa.org/clean-energy/renewable-energy/concentrating-solar-power-plants#.V9gD-zuyuAQ (last visited Sept. 12, 2016); Ken Wells, *Tortoises Manhandled for Solar Splits Environmentalists*, Bloomberg (Sept. 19, 2012), http://www.bloomberg.com/news/articles/2012-09-20/tortoises-manhandled-for-solar-splits-environmentalists.
101. *See* U.S. Energy Information Administration, Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2016 (Aug. 2016), *available at* https://www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf.
102. Declan Walsh, *Alienated and Angry, Coal Miners See Donald Trump as Their Only Choice*, N.Y. Times (Aug. 19, 2016), http://www.nytimes.

In a winner-loser or zero-sum formulation, the roles are simple and straightforward: for the environment to win, the coal miner must lose. But what actually happens when the environment "wins" at the expense of the miner? Sorry to report: everyone loses.

- The coal miner loses first because he has no job. But then he loses again because this broad-brush approach labels him as someone who *is opposed to environmental protection*. Rather than someone who simply wants to be able to provide for his family and make a decent living, the coal miner becomes the bad guy who hates the environment. And in that way, his community loses too; it loses jobs and faces a future of environmental antagonism, as coal communities now believe that for them to win, the environment must lose.
- Sadly, the environmentalist does not really win, either. By advocating for a policy that is seen as putting coal miners out of work, the environmentalist must contend with significant political pressure on federal, state, and local governments to overrule or amend environmental legislation or tie up regulation through costly court battles.[103] Moreover, once the environmentalist and the coal miner are seen as enemies, both lose the opportunity to work together for solutions to simultaneously advance their interests, as could be the case with economically beneficial carbon legislation.[104]

Importantly, just like a zero-sum characterization, this winner-loser scenario breaks down under scrutiny. The coal miner is a loser only if his interest is construed narrowly: i.e., to work at a coal mine. If his interests are defined more broadly as desiring a job and a way to support his family, the coal mine could close and he could still be a winner. An analysis by Adele Morris of the Brookings Institution shows that a carbon tax could provide ample revenues to support job retraining and retirement benefits for displaced coal workers, as well as fund mine reclamation, all with positive economic outcomes.[105] The coal miner is a "loser" if we narrowly confine our analysis of the situation to one issue (coal mine closure), instead of looking broadly for policies that could reduce carbon and build communities at the same time.

Winner-and-loser thinking implies that the winner is not just passively benefitting from a scenario, but is actively fighting *against* the loser. By talking about the environmentalists and coal miners as winners and losers, the coal miner reasonably believes the environmentalist is working against him and benefitting at his expense. In fact, coal use is declining in large part because of the economic competitiveness of natural gas and renewables, which in turn was fueled by the growth in the "pie" of natural gas supplies due to fracking and technological advances in renewable energy generation. Zero-sum and winner-and-loser thinking obscures the real history here, and impedes environmental progress.

These are not the days for zero-sum thinking. The stunning turn of the 2016 presidential election highlighted the dangers of winner-and-loser thinking: this time, it was the environmentalists who were the "losers" and the coal miners the "winners." But this is precisely why it is time to rethink our approach to environmental politics. As long as we narrowly look at environmental issues without considering economic justice and the health of communities, we will keep creating lose-lose situations. The environment does not benefit when a generation of people think it is their enemy, and the environmentalists will never win as long as they see coal miners as their adversaries.

I believe to continue our progress in addressing climate change and environmental protection, we have got to think *bigger*—think *holistically*—to avoid the winner-loser dichotomy. Environmental actions must be paired with social and economic justice programs, ensuring that efforts to create a "win" for the environment do not create a "loss" for vulnerable populations, economically disadvantaged communities, and people of color. We cannot think narrowly about closing the coal mine—we have got to think broadly about how to restore communities. We cannot "fix" the environment and then, as an afterthought, worry about the impacts of environmental policies on people.

Energy policy is enormously complex, with technology constantly changing the economics of sources and options available to meet future energy needs. While there are most certainly positive and negative consequences to resource options, our ability to mitigate negative consequences may change at a bewildering pace,[106] even as the industrial and technological landscape evolves and changes. Now is the time to set aside shallow characterizations and go deeper and look more creatively at our long-term objectives and policy choices.

Policies impacting energy and the environment must be analyzed together for their impacts on communities and individuals. Narrowing our gaze creates winners and losers. Effective energy policy requires the optimism to consider how to grow the size of the pie, the humility to know that the future is uncertain, and the foresight to challenge our assumptions and look for ways to work together to reach common goals.

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com/2016/08/20/world/americas/alienated-and-angry-coal-miners-see-donald-trump-as-their-only-choice.html.

103. U.S. Energy Information Administration, *Future Power Sector Carbon Dioxide Emissions Depend on the Status of the Clean Power Plan* (May 18, 2016), *available at* http://www.eia.gov/todayinenergy/detail.cfm?id=26292.
104. Dana Nuccitelli, *In Charts: How a Revenue Neutral Carbon Tax Creates Jobs, Grows the Economy*, The Guardian (June 13, 2014), https://www.theguardian.com/environment/climate-consensus-97-per-cent/2014/jun/13/how-revenue-neutral-carbon-tax-creates-jobs-grows-economy.
105. Adele C. Morris, *Build a Better Future for Coal Workers and Their Communities*, The Brookings Institute (Apr. 25, 2016), *available at* https://www.brookings.edu/wp-content/uploads/2016/07/Build-a-Better-Future-for-Coal-Workers-and-their-Communities-Morris.pdf.
106. Susan Kraemer, *One Weird Trick Prevents Bird Deaths at Solar Towers*, CleanTechnica (Apr. 16, 2015), https://cleantechnica.com/2015/04/16/one-weird-trick-prevents-bird-deaths-solar-towers/.

X. Questioning the Value of Solar

This section was authored by Shalanda H. Baker, Associate Professor of Law, University of Hawai'i School of Law.

At last, energy—that elusive thing that exists all around us, sustains myriad plant and animal life, and illuminates our homes—no longer requires massive infrastructure to be harnessed and converted into electricity. Technology now allows individuals and communities to erect solar panels that convert the sun's rays into electric currents to power homes, hospitals, and community centers. This rare moment in the transition of the energy sector from a system in which electricity is generated by burning fossil-fuels in centralized locations managed by public utilities, to a system where a range of electricity generation and management alternatives exists, has spurred a heightened level of regulatory and economic turmoil in jurisdictions around the United States. The disequilibrium created by customer-sited energy generation threatens to destabilize and reinvent our energy system. If only we would let it.

Industry observers attribute the swift rise of rooftop solar adoption over the past decade to progressive policies and rapid technological advancements. Tax incentives have effectively decreased the cost of owning and installing solar panels. Net energy metering policies pay rooftop solar owners at the customer's retail electricity rate for each kilowatt-hour of electricity generated by the customer. These programs leave some customers with electricity bills totaling zero dollars, effectively turning their electricity meters backwards when solar panels are fully engaged.

This dramatic increase in customer-sited distributed energy generation has challenged the utility sector and destabilized the so-called regulatory compact, whereby utilities receive a regulated reasonable return on electricity infrastructure investments in exchange for providing electricity. The overall dynamic confronting utilities in this transitional moment has led to what some have termed the "utility death spiral." In the new, distributed-energy paradigm, utilities can no longer rely on the prior revenue levels from their customer bases to recover costs for infrastructure improvements or to recoup their regulated reasonable return on such investments. Further, in an era of increased distributed energy generation, utilities cannot easily predict what types of infrastructure investments are needed. Thus, they face a "death spiral," a term that reflects an operating environment with rife economic uncertainty.

As a result of these economic challenges, utilities have fought for preservation of the status quo. They argue that net-energy metering places an unfair burden on customers who lack access to solar panels. To support this argument, they note that net-energy-metering customers tend to generate electricity during the day, during low electricity usage hours, and draw electricity from the grid during peak electricity usage times, but because net-energy metering zeroes out the electricity bill of such customers, these customers never pay their fair share to maintain the grid. Thus, utilities argue, rooftop solar customers create a "cost shift" to those who cannot, due to poverty, home ownership status, or geography, install solar panels.

These assertions have given rise to a debate. In regulatory proceedings exploring the fairness of such net-energy metering programs, regulators around the country have begun to ask, "What is the value of solar?" Said another way, does the compensation amount offered to net-metering customers overcompensate such customers for their contributions to the electricity grid and overvalue distributed energy contributions? If the answer is yes, as utilities have argued, then compensation should be adjusted downward to account for the cost of delivering distributed energy to the grid. Under this formulation, the utility's guaranteed return on investment, which it recoups from the customer rate base, would be spread more broadly among the customer base because solar adopters would receive less economic value for the electricity service they provide. Further, by lowering the compensation rate for rooftop solar, the utility retains more economic value and is spared from "shifting" the cost of grid maintenance (and the regulated return) on to non-solar customers.

The foregoing framing sets the stage of this unique transitional moment. By most observations, what has emerged is a battle between the traditional and the disruptive. Indeed, the increasing number of individuals able to generate electricity through rooftop solar panels is perceived as a threat to utility incumbents, whose current business model depends on a stable base of electricity customers to contribute to the cost of maintaining the grid. Any economic gains rooftop solar customers receive harm non-solar customers in equal measure.

The transition to a cleaner energy system, some utilities suggest, should be done through investments in large-scale renewable energy projects rather than distributed energy generation. For their part, solar companies, the disruptive innovators that make rooftop solar panels, see utilities as antiquated and resistant to change. Solar companies have argued that increased rooftop solar adoption "greens" the grid and creates decentralized pockets of electricity generation that offer grid stability in volatile weather. Traditional utilities, they argue, must adapt their business models to the increasing amount of distributed energy resources on the grid, or become obsolete.

But this framing obfuscates what is at stake: a just energy transition. Moreover, it limits opportunities for true transformation of the energy system and the regulatory model that supports it. In this zero-sum formulation, the direct benefit gained by solar adopters is a precise measure of the additional payments that must be paid by other customers to maintain the grid, pay for the costs of grid improvements, and ensure the utility's return on investment. In this frame, the question whether the regulatory model is itself a useful or just feature of a modern energy system is sidelined, never asked, in favor of calculating whether non-solar customers somehow bear the cost of paying the utility's guaranteed return. In its very asking then, the question

regarding the true value of solar immediately loses its disruptive potential. Locked within a flawed frame, the question, and answer, will always be marred by the measure of what is lost by the utility customer and gained by some other party—a customer, a solar company. Most tragically, these calculations will almost always be made within a regulatory model that is itself undisturbed.

At its core, the energy transition invites a reckoning and accounting of the existing energy system. The energy transition provides an opening to expose the injustice embedded in the existing energy system, and the ways this system's ongoing reliance on centralized generation, centralized ownership, and the regulatory compact may actually foster climate change vulnerability, climate injustice, and environmental injustice. The transition offers a rare moment, within its early-design phases, to examine the myriad ways in which the old energy system divests individuals and communities of true choice and participatory decisionmaking with respect to meeting their energy needs.

The transition also allows us to examine alternative economic models, such as community power, for the delivery of electricity. Such an analysis could help to expose the challenges of energy poverty, energy security, and energy access in this country; provide an opening to critique the socioeconomic aspects of the energy system itself that require families to make difficult choices between paying the electric bill and buying groceries; and offer viable alternatives to the existing energy system.

To uncover these tremendous stakes, rather than ask, "What is the value of solar?", legislators and regulators might instead ask, "What is the cost of a failure to transition to a decentralized, clean system of electricity generation and distribution, where ownership of energy is spread among diverse stakeholders and the cost of energy is drastically reduced?" Further, what is lost, and what remains, if the status quo ante persists? What might a new energy system, incorporating principles of economic fairness, energy democracy, and climate and environmental justice, look like?

This new manner of questioning inverts the frame and allows for a broader exploration of what is at stake during this transition—as viewed from the perspective of what is possible, rather than from within the limitations of the existing paradigm. It places the incumbent in the foreground as a subject of critique and examination, rather than frame the disruptor as the subject of critique and examination or, misleadingly, as our collective savior.

This questioning further invites the exploration of the range of possible regulatory and economic solutions to facilitate a just transition to a clean energy future. It allows policymakers to trim away the irrelevant elements of the current electricity system to expose the vibrant aspects of the system that must be preserved during this moment of transition. It also allows for deeper innovation considering the opportunity posed by distributed energy resources and alternatives to large-scale energy development. In short, shifting the incumbent from background to foreground releases the blinders imposed by the "value of solar" frame—itself a zero-sum postulation that pits solar adopters against non-solar customers—and allows for a comprehensive consideration of energy justice.

When regulators ask, "What is the value of solar?" embedded at the end of the question, in an invisible parenthetical, are the words, "to the existing system." Such framing answers the question before it is asked, because it assumes preservation of the system itself, which is to say, a centralized electricity grid, a traditional electricity utility, regulated returns on investment, and the same system of energy production and distribution. By virtue of this discursive framing, the question itself is relegated to the margins and value is evaluated within a pre-defined system, from which pre-defined units of value are extracted. Although some jurisdictions have begun to move beyond the purely economic framing of the answer to the value of solar question to incorporate environmental considerations, I would argue that the question itself must be interrogated.

XI. Less Than Zero: The Zero-Sum Game That Hurts Local Communities and Ecologies

This section was authored by Jonathan Rosenbloom, Professor of Law, Drake University Law School.

Local communities and their ecology suffer hardship from a zero-sum game over governance authority.[107] This game pits communities (and their local governments, including special purpose districts) against state governments in a constant and unwinnable(ish) conflict over the authority to regulate or, as often happens, not regulate.[108] Although this zero-sum game is a struggle between states and communities over the authority to make policy, the manner in which it is skewed against local communities has dire consequences on the environment and discourages local communities from protecting and investing in their local ecology.[109]

107. For purposes of this essay, "governance authority" refers to the legal power a specific level of government has to act. This essay is predominantly concerned with governance authority at the local and state levels. For a more in-depth discussion over how governance authority is divided among levels of government, see Blake Hudson & Jonathan Rosenbloom, *Uncommon Approaches to Commons Problems: Nested Governance Commons and Climate Change*, 64 Hastings L.J. 1273 (2013).

108. *See*, *e.g.*, City of Commerce City v. State, 40 P.3d 1273, 1285 (Colo. 2002) (en banc) (invalidating local use of automated photograph system recording traffic violations for having an extraterritorial impact); People ex rel. Pub. Utils. Comm'n v. Mountain States Tel. & Tel. Co., 243 P.2d 397, 402 (Colo. 1952) (en banc) (same concerning telephone rates); City of Des Plaines v. Chi. & N.W. Ry. Co., 357 N.E.2d 433, 435-36 (Ill. 1976) (same concerning local noise pollution controls); Harris Bank of Roselle v. Vill. of Mettawa, 611 N.E.2d 550, 558-61 (Ill. App. Ct. 1993) (same concerning private treatment of wastewater); Holiday Universal, Inc. v. Montgomery County, 833 A.2d 518, 524-27 (Md. 2003) (same concerning prohibition on unfair practices in service contracts).

109. *See* Keith Hirokawa & Jonathan Rosenbloom, *The Cost of Federalism: Ecology, Community, and the Pragmatism of Land Use*, *in* The Law and Policy of

In our federalist form of government, states hold plenary power. Since the mid-19th century, most courts have held that local governments are creatures of and subject to the whim of state legislatures.[110] Two limitations on state legislative control over local communities are state constitutions[111] and state statutes.[112]

State and local governments frequently exercise regulatory authority over critical environmental issues, such as those related to fracking, waste management, and water. As a legal matter, local authority to intervene in potentially controversial activities may turn on whether that authority has been preempted by the state or even the federal government. While the preemption analysis varies by state, it typically prohibits local governments from regulating: (1) where the state expressly preempts local action; (2) where the state heavily regulates the field (but does not expressly preempt); and (3) where there is a direct conflict between the state and local regulation (again, in lieu of express preemption).[113]

Preemption analysis is structured in a way that forms a zero-sum game. If the state wins and preempts a local law, the local community loses the ability to regulate in that area and the local action is null and void. In rare cases where local communities win,[114] states may or may not have concurrent authority. While state and local governments often simultaneously regulate, zero-sum disputes typically arise after an actual conflict surfaces and the case turns to preemption—where there can be only one winner.

When it comes to the environment, structuring local authority to regulate around a zero-sum game has at least two unintended consequences: (1) it may be perceived as absolving some governmental entity (whichever loses the preemption struggle) from responsibility over the sustainable management of natural resources; and (2) it discourages local communities (typically the losers in preemption struggles) from investing in their ecology by disempowering them, even though they often have the greatest potential exposure to environmental harms.

The regulation of pesticides and fertilizer in the Mississippi watershed provides an example of communities having little or no regulatory authority over a natural resource, even though that resource is critical to the provision of local services and pollution of that resource directly affects them. Most of the regulatory authority over agricultural runoff of fertilizers and pesticides is left to the states.[115] Whether local governments are authorized to regulate in large part depends on whether the relevant state has preempted local authority.

In most agricultural states in the Mississippi watershed, the regulation of pesticide and fertilizer by local governments is straightforward—they cannot do it. In Iowa, for example, "A local governmental entity shall not adopt or continue in effect local legislation relating to the use, sale, distribution, storage, transportation, disposal, formulation, labeling, registration, or manufacture of a pesticide"[116]; and "A local governmental entity shall not adopt or continue in effect local legislation relating to the use, sale, distribution, storage, transportation, disposal, formulation, labeling, registration, or manufacture of a fertilizer or soil conditioner."[117]

To be sure, Iowa is not alone. Thirty states expressly preempt local governments from interfering with pesticide use and 13 more allow local governments to act only upon approval from state bodies.[118] Only seven allow local governments to regulate pesticide use in their local communities—and none are in the Mississippi watershed.[119]

Here is an example of the state "winning" the zero-sum game through express preemption. The state wins in the sense that it, and not the local community, has the authority to regulate (when the state exercises that authority, the actual winner may be the farming industry and the losers are those dependent on the water as drinking water).

Even when a state does not expressly preempt local action, it can still "win" and displace local control. For example, Humboldt County, Iowa, passed an ordinance stating: "No person . . . shall . . . apply livestock manure on any land in Humboldt County that drains into an agricultural drainage well or sinkhole in a manner that results in the contamination of groundwater."[120] The Iowa Supreme Court struck down the ordinance, ruling it was preempted because it established a higher standard than the state's standard for the regulation of confined ani-

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Environmental Federalism: A Comparative Analysis (Kalyani Robbins & Erin Ryan, eds. 2015).

110. *See* Hunter v. City of Pittsburgh, 207 U.S. 161, 174-80 (1907) (holding that local governments are creatures of state law and that the U.S. Constitution does not protect local governments from state government intrusion). *But see* Avery v. Midland Cnty., 390 U.S. 474, 482-86 (1968) (holding that a state may not create a general purpose local government that apportions voting unequally in violation of the Constitution).
111. *See*, *e.g.*, Robinson Twp. v. Commonwealth, 83 A.3d 901, 43 ELR 20276 (Pa. 2013) (holding state's attempt to preempt local government regulation of fracking was in violation of state constitution).
112. *See*, *e.g.*, Virginia Code §15.2-2280 (authorizing local communities to regulate land uses).
113. Jonathan Rosenbloom, *New Day at the Pool: State Preemption, Common Pool Resources, and Non-Place Based Municipal Collaborations*, 36 Harv. Envtl. L. Rev. 445, 451 (2012) (citing Talbot Cnty. v. Skipper, 620 A.2d 880, 882-83 (Md. 1993)).
114. *See*, *e.g.*, *Robinson*, 83 A.3d at 901.
115. Nonpoint source is not defined in the federal CWA. National Wildlife Federation v. Gorsuch, 693 F.2d 156, 166, n.28, 13 ELR 20015 (1982). In 1987, EPA defined nonpoint source pollution as pollution:
> [C]aused by diffuse sources that are not regulated as point sources and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc. . . . In practical terms, nonpoint source pollution does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition, or percolation.

U.S. EPA, Office of Water Regulations and Standards Nonpoint Source Guidance (Aug. 1987). The classification of agricultural runoff from federal regulation is being challenged in *Bd. of Water Works Trustees v. Sac Cty. Bd. of Super.*, No. C 15-4020-MWB (N.D. Iowa).
116. Iowa Code Ann. §206.34.
117. Iowa Code Ann. §200.22.
118. Matthew Porter, *State Preemption Law: The Battle for Local Control of Democracy*, Pesticides & You, Vol. 33, No. 3 (Fall 2013), *available at* http://www.beyondpesticides.org/assets/media/documents/lawn/activist/documents/StatePreemption.pdf.
119. *Id.*
120. Goodell v. Humboldt, 575 N.W.2d 486, 490 (1998) (citing Ordinance 24: groundwater protection).

mal feeding operations.[121] Here was an attempt by a local community to internalize or manage the external impacts stemming from agricultural runoff in its jurisdiction, and that ordinance was struck down because it provided more protection.

The examples above illustrate that allocating authority in a zero-sum way disconnects communities from their ecology, even though communities are primarily responsible for securing and maintaining critical services that depend on the local ecology. For example, runoff deteriorates the very ecosystem (resulting in toxic algae blooms and the dead-zone in the Gulf of Mexico) on which communities rely to provide basic services (such as potable water)[122] and recreation.[123]

Prohibiting or discouraging local communities from implementing best practices to sustainably manage the watershed, including buffer strips, zoning for manure stacks, limits on storage and application, and setbacks, disincentivizes communities from engaging and protecting their local ecology. This is not to suggest that local governments always seek to protect natural resources. Rather, it is to suggest that local governments be permitted to take action when they are protecting the health of their local ecology.

The examples also raise unexplored questions, including: Whether the state vs. local binary analysis oversimplifies the complexities embedded in regulating multi-jurisdictional ecosystems? Whether it is a justifiable method for regulating the environment? Is state preemption a hidden means to permit one local use with large externalities to trump another local use that wants to stop those externalities? As it stands, structuring local communities' authority around zero-sum battles results in the environment getting the short end of the stick and communities coming out less than zero.

XII. Deconstructing Zero-Sum Environmental Games: Bears Ears National Monument as Reparations and Reconciliation

This section was authored by Sarah Krakoff, Raphael J. Moses Professor of Law, University of Colorado.

Owls versus jobs. Water for farmers versus water for salmon. Big dam versus tiny fish. Environmental disputes are often described in this way, as contests over limited resources that require one side to lose in order for the other to win. Many environmental conflicts may not be zero-sum games according to technical game-theoretic definitions, but characterizing them in this way has traction with the media, the public, and the parties themselves. The zero-sum description frames our debates, often hardening positions and limiting the range of options, both practically and conceptually. Indeed, "I win, you lose" views of the world seem to be corroding every aspect of our public and private lives.

Rather than tinker from within this frame, what if we pulled back the lens and viewed natural resource conflicts in their historical and social contexts? Owls-versus-jobs is the snapshot. The long view would describe how federal forest service policies subsidized unsustainable logging, resulting in undiversified and therefore fragile economies. It would also include how efforts to undermine labor organizing in the Pacific Northwest prevented alliances between environmentalists and loggers. Another part of the story would acknowledge that limitations in federal environmental laws lead to over-reliance on single species strategies.

The longer view is harder to describe in a bumper sticker. But excavating the historical forces that lead to particular environmental disputes may help us move beyond pat and unhelpful dichotomies. In the heat of the conflict, it may feel like owls are the opposite of jobs, but reifying that feeling is neither historically accurate nor normatively attractive. Who wants to live in a world where we have to choose between those two?

Let's consider one of President Obama's last acts as Chief Executive in this context. On December 28, 2016, President Obama designated Bears Ears National Monument pursuant to his authority under the Antiquities Act of 1906.[124] Bears Ears includes narrow canyons that wind their way to the Colorado River, wild sandstone uplifts and towers, and troves of ancient Puebloan ruins.

The Monument was proposed by the Bears Ears Intertribal Coalition, with support from regional and national environmental groups. Its 1.35 million acres lie in the heart of Utah's dramatic redrock country, where the forces of water and wind turn cliff walls into natural works of art. Canyonlands and Arches National Parks lie to the north and the eerie blue waters of Lake Powell to the south. The human population is sparse, and reflects the different waves of migration to this parched corner of the world—Utes, Paiutes, Navajos, Mormons, and hippy/artist/bohemians each lay claim to parts of the neighboring small towns.

While outsiders who visit may see little reason to oppose greater protections for this extreme landscape, feelings in Utah run high. Gov. Gary Herbert infelicitously described the proposal as a "political tomahawk," and at a public hearing staged for opponents of the Monument, said, "It is my belief that a unilateral monument

121. *Id.* at 505.

122. *See, e.g.*, Business Record, *Your Guide to the Water Works Lawsuit*, *available at* http://www.businessrecord.com/PrintArticle.aspx?aid=68385&uid=718a9d24-4d05-4710-b37d-66850cc411e5 (describing Des Moines Water Works' struggles with extracting nutrients out of water).

123. *See, e.g.*, *Water Quality Monitoring*, Iowa Department of Natural Resources, http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Monitoring/Beaches (noting that on August 5, 2016, the Iowa Dep't of Natural Resources marked "swimming not recommended" in at least 15 rivers).

124. Presidential Proclamation: Establishment of the Bears Ears National Monument Proclamation, Dec. 28, 2016, *available at* https://obamawhitehouse.archives.gov/the-press-office/2016/12/28/proclamation-establishment-bears-ears-national-monument.

designation will divide the people. It will create anger and division. It will provoke protest and may inhibit our ability to resolve tough public land management decisions for decades to come."[125] After the designation, members of Governor Herbert's political party made good on his predictions of acrimony. The Utah Legislature described the designation as a "blatant federal land grab."[126] Sen. Orrin Hatch (R-Utah) called it an "attack on an entire way of life."[127] The zero-sum framings by Governor Herbert, Senator Hatch, and others include "Preservation Versus Democracy," "Resource Extraction Versus Preservation," "Local (Non-Indian) Control Versus Outsider Influence," and various versions of "Jobs Versus Environment."

One way to counter the zero-sum characterizations is to point out that monument designation does not foreclose many different uses of public lands. Indeed, despite misleading reports, the Proclamation recognizes preexisting mining and grazing rights. Uses that are precluded (new mining, drilling, and other extractive uses) will be balanced by new economic opportunities (outdoor recreation businesses, tourism, and hospitality) for people in the region. Further, the Monument's final boundaries were themselves a compromise, excluding 550,000 acres from the original proposal in response to local Republicans' concerns. Most of the excluded acreage includes lands that have potential for mineral or fossil fuel extraction. These responses are important, but the anti-Monument crowd will likely remain convinced that they lost because preservation won. In addition, responding solely within the zero-sum framing omits the most compelling case for the Monument's designation. So, let's widen the frame.

Cedar Mesa, the uplifted plane that ascends to the Bears Ears buttes and comprises the heart of the Monument, has been the intermittent home to indigenous peoples of the Southwest since at least 6500 B.C.E. Artifacts, textiles, and rock art from each period of human occupation have left their mark. Around every canyon bend, or so it seems, is another cliff dwelling or petroglyph. The human population ebbed and flowed in the region until roughly 1300 C.E., when the ancient Puebloans left Cedar Mesa for the last time until the modern era.

Fluctuating habitation makes sense in Bears Ears' stark landscape; it is a tough place to be on a continuous basis. Endemic animal and plant species provide mute testament. Consider the Great Basin spadefoot toad and the red spotted toad. They spend dry periods in states of near-suspended animation, burrowing into the sand or under rocks. With just enough rain to awaken them, they spring to life, filling shallow pools with a froth of tiny pink amphibians. Native plants, like Indian rice grass, narrow, leaf yucca, and kachina daisies, have their own survival strategies for high desert living. One thing they all have in common: they make do with very little water.

The five tribal nations of the inter-tribal coalition—Hopi, Navajo, Uintah and Ouray Ute, Ute Mountain Ute, and Zuni—have endured far more than the climactic conditions. The five tribes, and many others (including Paiutes, Goshutes, and Pueblo peoples) at one time populated all of southern Utah. American invasion and settlement, accompanied by military force, nearly eliminated tribal peoples from the southern part of the state by the late 1800s. Today, only a small strip of the Navajo Reservation and a tiny community of Ute Mountain Utes remain in Utah's southeastern quarter.

And yet the tribes' attachment to Bears Ears remains fierce. Bears Ears is a place of origin stories. The renowned Navajo leader, Chief Manuelito, who negotiated the Treaty of 1868 that enabled his people to return to their homeland, was born in the shadow of the Bears Ears buttes. Tribal members from all over come to Bears Ears to collect piñon nuts, firewood, and native plants for medicine. Families hold ceremonies for their children, and visit the ancient Puebloan sites that belonged to their relatives. Elders and medicine people tend to the land. Designating Bears Ears as a national monument, open to all but managed in consultation with the tribes, constitutes a small gesture of reparations for tribes' forced ejection from their ancestral lands.

Bears Ears is reparative in another way. The Antiquities Act of 1906 is rightly celebrated as a tool that achieved breathtaking conservation across our public lands. Many of our most beloved national parks started out as monuments. The Grand Canyon, Petrified Forest, Zion, Bryce, Arches and more were first protected by the stroke of a presidential pen. But for tribes, there is a dark side to this history. Lands that were "preserved" from settlement or extraction were often tribal lands. The Havasupai people of the Grand Canyon lost their plateau lands and their way of life to preservation policies. "Protecting" Yosemite Valley entailed ridding it of the Miwok and Paiute people who lived there. Similar stories, though unique in their grim details, can be told about parks and monuments throughout the West.

The Bears Ears is the very first national monument proposed by a coalition of tribes. Many conservation groups supported the Bears Ears proposal, but it is, and has been, an indigenous movement from the beginning. President Obama's use of the Antiquities Act to restore tribal connections to their lands (instead of sever them) constituted an audacious act of hope. The proclamation designating Bears Ears provides cause, to paraphrase Martin Luther King Jr., to believe that the arc of conservation history might bend toward justice. Despite all of this, Bears Ears might still seem like a zero-sum game to some. But that will not endure. In the long view, an action that protects the land and its creatures while add-

125. Brian Maffly, *Utah Guv Calls Pro-Bear's Ears Monument Proposal "a Political Tomahawk,"* Salt Lake Trib., July 27, 2016, *available at* http://www.sltrib.com/news/4159848-155/utah-guv-calls-pro-bears-ears-monument.

126. Speaker Greg Hughes Statement About Bears Ears National Monument Designation, Dec. 28, 2016, *available at* http://house.utah.gov/2016/12/28/media-statement-speaker-greg-hughes-statement-about-bears-ears-national-monument-designation/.

127. Brian Maffly & Thomas Burr, *Obama Declares Bears Ears National Monument in Southern Utah*, Salt Lake Trib., Dec. 28, 2016, *available at* http://www.sltrib.com/home/4675012-155/mike-lee-staffer-says-bears-ears.

ing justice to the world has no losers. The world is small, but it is bigger than that.

XIII. *Juliana v. United States* and Our Zero-Sum Climate System

This section was authored by Melissa Powers, Jeffrey Bain Faculty Scholar and Professor of Law, Lewis & Clark Law School.

On November 10, 2016, federal district court Judge Ann Aiken issued an astonishing decision in the atmospheric trust climate case, *Juliana v. United States*.[128] The decision holds that the plaintiffs in the case, who include children and young adults ranging from 9 to 21 years old, have a fundamental right "to a climate system capable of sustaining human life."[129] The decision further recognizes that the federal government has a public trust obligation to protect resources from the consequences of climate change, including ocean acidification and sea-level rise.[130] As a result of this decision, the plaintiffs will now be able to go to trial to prove, among other things, "that defendants played a significant role in creating the current climate crisis, that defendants acted with full knowledge of the consequences of their actions, and that defendants have failed to correct or mitigate the harms they helped create in deliberate indifference to the injuries caused by climate change."[131]

If the plaintiffs succeed at trial—as I believe they should—the case should then proceed to the relief stage. Plaintiffs have asked the court to order the federal government to protect the plaintiffs' fundamental rights and to ensure protection of the trust assets by developing a plan to reduce greenhouse gas emissions. Although resolution of the case could take years, and will almost certainly involve appeals to the U.S. Court of Appeals for the Ninth Circuit and Supreme Court, the *Juliana* decision is already a landmark decision. In the context of this series of essays, moreover, the *Juliana* decision illustrates how and when zero-sum framing is a useful environmental and moral device.

These essays have done an excellent job of illustrating the ways in which zero-sum ideas have been used and misused in the arenas of conservation and environmental law. As Jessie Owley notes above, the zero-sum concept arises out of economic theory but has been altered in legal, and especially political, dialogue to stand for the idea that environmental regulations often produce an "I win, you lose" outcome. Too often, this depiction of winners and losers creates an untenable dichotomy pitting jobs or the economy against the environment, which often results in regulatory compromises that unnecessarily weaken environmental protections. As several other authors, including Keith Hirokawa and John Dernbach, note, this representation of winners and losers is often false and incomplete. Indeed, economic prosperity and job growth usually accompany environmental preservation. While there may be situations in which a particular resource user's goals will be stymied by a conservation law, many environmental laws create win-win, rather than win-lose, dynamics.

However, although environmental *laws* rarely create zero-sum dynamics, some environmental conditions truly are zero-sum. As J.B. Ruhl explains, the zero-sum economic theory refers to an economic state in which all win-win resource allocations have been made, and any additional transactions must benefit one person at another's expense. Once an economic system reaches that zero-sum stage, it is considered to be "Pareto optimal," or economically efficient. Any further allocations will be considered suboptimal, because a person can win only if another loses. This does not mean that no further allocations should occur; it simply means that all the win-win transactions have been exhausted.

In the case of climate change and the acceptable levels of greenhouse concentrations in the atmosphere, we are well past the zero-sum threshold. Current atmospheric carbon dioxide (CO_2) concentrations exceed 400 parts per million (ppm), but scientists tell us concentrations must drop to at least 350 ppm if we are to have a chance of avoiding uncontrolled catastrophic consequences of climate change.[132] There is no way to create a win-win scenario that would allow additional emissions of greenhouse gases, because any new emission releases must be offset by emissions reductions from somewhere else. The science of climate change is truly zero-sum.

Strategies to address climate change, however, need not be—or at least not in a way that pits jobs, economic growth, and environmental protection against each other. Indeed, a number of the essays have identified strategies that can produce win-win outcomes with the right amount of planning and proper design. Some of the ones identified by Jim Salzman and David Takacs attempt to change potential zero-sum outcomes into win-win outcomes through compensation, regulatory flexibility, or ecosystem services models. Shalanda Baker and Inara Scott illustrate how strategic policies designed to transition our energy system away from fossil fuels can similarly avoid the zero-sum dynamic or at least ensure a just energy transition.

To be sure, effective climate change mitigation will require us to abandon fossil fuels entirely, and companies that insist upon continued exploitation of these resources will lose out in the end. However, with the proper amount of planning and thought, we can develop climate mitigation and adaptation strategies that will avoid creating too many winner-versus-loser scenarios. Thus, while climate change itself has reached a zero-sum state, climate change policies can create far more winners than losers.

128. Order Denying Motion to Dismiss, Civ. No. 6:15-CV-01517-TC, 2016 WL 6661146 (D. Or. Nov. 10, 2016).
129. *Id.* at *15.
130. *Id.* at **21-22.
131. *Id.* at *17.
132. Reto Knutti et al., *A Scientific Critique of the Two-Degree Climate Change Target*, 9 Nature Geoscience 13 (2016), *available at* http://www.nature.com/ngeo/journal/v9/n1/full/ngeo2595.html.

The *Juliana* litigation capitalizes on this distinction between the science and the policies. The plaintiffs' claims place climate science front and center in the litigation. In arguing for their fundamental rights and raising public trust claims, the plaintiffs have essentially asked the court to find, based on the science, that the atmosphere has reached a zero-sum state. A court ruling affirming the accepted science of climate change could also help dispel the myths underlying climate denialism. This myth-busting is particularly important now, when the new Administrator of EPA, Scott Pruitt, has openly rejected the scientific reality of climate change. A ruling in favor of the *Juliana* plaintiffs will place climate denialists on the losing side, where they belong.

Not only would a victory in *Juliana* represent a significant advancement in climate law, it would alter the false narrative that the climate system can absorb continued increases in greenhouse gas emissions because future emissions decreases will at some point occur. For decades, the federal government has focused on developing policies that aim to reduce some greenhouse gas emissions from some sources, while authorizing massive increases of greenhouse gases from others. Although the Obama Administration had few alternatives to this incremental approach when Congress refused to be a partner in addressing climate change, the Obama Administration also supported projects that increased fossil fuel production and use. Indeed, the Obama Administration touted its support for an "all-of-the-above" energy policy that was previously embraced by George W. Bush.

While "all-of-the-above" reflects a desire to ensure that everyone in the energy sector continues to prosper, climate science makes it clear that continued fossil fuel use is a lose-lose proposition for society at large. If the plaintiffs win the liability phase of their litigation, they will have secured a ruling that accepts that the climate system has reached a zero-sum state. Once we as a society recognize this reality, we will then be able to focus on developing nonzero-sum strategies to move us forward.