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Why Environmental Zero-Sum Games are Real

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Chapter 1
Why Environmental Zero-Sum Games Are Real

J.B. Ruhl and James Salzman

Politicians and nongovernmental organizations (NGOs) love to talk about the glossy world of "win-win scenarios" in the environmental field. Battling climate change will grow the renewables sector and create thousands of green jobs. Catch share programs will increase the fishing community's incomes and also conserve fisheries. Energy conservation saves fuel bills and drives efficiency improvements. Famed Harvard Business School Prof. Michael Porter even hypothesized that countries with stricter environmental regulations are more competitive in the global marketplace. Choose the slogan—"Environmental protection is not only a good thing to do, it's good for you!" or "You can do well by doing good!"

The win-win theme has become pervasive in environmental rhetoric. Indeed, in *Nonzero: The Logic of Human Destiny*,[1] 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. While an attractive proposition at the general level, in this chapter we push back and argue that from the perspective of the lived experience and local politics, zero-sum games are not only present in environmental policy, but unfortunately frequent. Indeed, the dynamics of environmental protection make zero-sum scenarios particularly challenging. As a result, a number of strategies have developed—whether financial, rhetorical, or regulatory—that seek to soften the impact on losers or change their perception of the unfairness of their loss.

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). In a very real sense, this equilibrium is where markets are driving participants. When buyers and sellers haggle in the bazaar, they

1. Robert Wright, Nonzero: The Logic of Human Destiny (1999).

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are in a win-win (nonzero-sum) state in which both can gain. If they reach a deal, both are better off than when they started. Economists call this Pareto optimality[2]—neither participant can gain further without the other losing. Markets depend on traders to identify nonzero-sum situations and trade away until they reach the optimal distribution, at which point it looks like zero-sum going forward.

The difference between a nonzero-sum and a zero-sum game is that the latter *starts out* at the Pareto optimal state. No trade can be a win-win. Options and futures markets, for example, are necessarily zero-sum games for the individual traders—for every winner there is a corresponding loser on the opposite side of the trade. There are reasons why parties participate in these exchanges, however, such as hedging risk, and options and futures markets contribute to overall market liquidity. So, while in isolation a futures market transaction is a zero-sum game, the fact that traders engage in them suggests that it is not truly zero-sum from the larger perspective. Still, it hurts to be on the losing end!

In a true zero-sum game, assuming the participants are what economists describe as "rational economic actors," trading would not occur unless some of the participants were forced into it. Being in a zero-sum game can be a sticky situation, therefore, 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, they would not collectively 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 the participants alone. Sometimes government, in pursuit of a desired social policy, intervenes to force a "trade" at least some of the participants would not voluntarily (rationally) make.

If Wright's thesis is correct, however, then government ought to be able to intervene on behalf of social policy, including environmental protection, without concern about unsettling any participants because most social contexts really operate as nonzero-sum 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 benefits 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

2. The term is named after Vilfredo Pareto (1848-1923), an Italian engineer and economist who used the concept in his studies of economic efficiency and income distribution.

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rests on Wright's 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. This is a classic justification for the benefits of environmental regulation. Wright's argument wins out.

There is only one problem with this account: Try telling the farmers this is not a zero-sum game. The basic flaw with Wright's thesis, and with using it to justify environmental policy, is that it only makes sense in a specific frame. There is no question that social-ecological systems (SES) are highly complex and interconnected, making true zero-sum games hard to find. At a macro scale, one can describe multiple nonzero-sum outcomes where there are overall benefits. But politics and impacts occur primarily at the *local* level. If one uses a local rather than regional or national frame to view the situation, the farmer is watching more water flow past the farm in the river while he ends up with less than before. Regardless of what folks with lots of advanced degrees tell him, to the farmer it looks like zero-sum.

To be sure, when viewed through a wide frame, there are plenty of examples of win-win scenarios in the environmental field. There are even win-win examples at the local level, but it's 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, particularly at the local level. As described above, farmers in the Klamath Valley see their irrigation water allocation reduced because the endangered salmon need more. Fish win. Farmers lose. In the 1990s' spotted owl saga in the Pacific Northwest, 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.

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Most environmental policies have winners and losers. That is one reason why it is such a contested terrain. One might argue that these policies benefit society overall, but it rarely feels like a benefit to the local resource-dependent communities or polluting industries and their employees. Indeed, just as the environmental justice movement emphasizes protection of local communities from the harms of broader economic interests, the zero-sum tension in regulatory contexts is most salient when the winners are geographically diffuse and the losers are locally concentrated. The difference, of course, is that environmental policy is coming to the rescue of the local community in the case of environmental justice, whereas it can be the agent of locally concentrated economic harm in the case of environmental regulation. The local community of losers in those cases sense that they are trapped in a zero-sum conflict where they need to stand their ground against distant opposing interests who would have them reduce their emissions, water usage, or timber harvest for the benefit of the greater good. "Either I win and continue the status quo, or they win and I have to pay, or perhaps even go out of business." Appeals to the intrinsic value of nature do not get very far with most people who feel rammed into such "loser" situations.

The challenge of geographically diffuse winners and locally concentrated losers also has strong political implications. Public choice theory predicts that concentrated interests will often prove more successful in the political process than diffuse interests, even when the concentrated interests are clearly detrimental to the general welfare. This theory explains well why massive sugar cane subsidies have persisted in South Florida for decades despite enormous harm to the Everglades ecosystem, and why the copyright protection period keeps being extended (thanks to lobbying from Walt Disney, Inc., to retain its control over Mickey Mouse) even though the extension keeps vast intellectual property resources out of the public domain. So, too, in zero-sum games, should we expect the local interests who feel like they are losing to loudly and effectively oppose specific environmental policies, even if the overall benefits, as Wright argues, outweigh the local harms?

I. Managing Zero-Sum Conflicts

The local losers will not always win in the political arena, however, but given how powerful zero-sum framing can be, it should not be surprising that environmental law has developed a range of strategies to address their objections. The approaches fall under four basic categories: (1) There Should Be Losers; (2) Grow the Pie; (3) Regulatory Flexibility; and (4) Persuasion. The

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first three confront zero-sum scenarios head on to win over the losers; the last tries to avoid them by proselytizing Wright's *non-zero* world view.

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 that favors certain results over others. Companies that discharge dangerous toxics into a local stream should be forced to stop, even if it does hurt their bottom line. In the zero-sum conflict of continuing pollution 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? The same goes for opening up public lands for coal mining. The winner depends on which administration is running the Bureau of Land Management (BLM). A strategy that assumes the losers in zero-sum conflicts deserve it looks great if your team is in power. It can seem punitive or worse if you are on the losing side. Just how bad a problem is, in other words, is in the eye of the beholder. No wonder, then, that this strategy can lead to strong pushback, whether through protracted litigation, overblown rhetoric, or, in the extreme, armed standoffs such as the one that occurred at the Malheur National Wildlife Refuge.[3]

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 so they are no worse off than before. We generally see this approach where the potentially losing party is politically powerful. For example, agricultural interests are more often generously paid to protect the environment. This occurs in the multibillion dollar Conservation Reserve Program. Some fisheries facing restrictions have benefitted 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) Amendments explicitly sought to compensate coal mining communities for the expected losses in jobs digging high-sulfur Appalachian coal. Growing the

3. On January 2, 2016, armed militants seized and occupied the headquarters of the Malheur National Wildlife Refuge in Oregon in an effort to show that the U.S. Forest Service, BLM, and other government agencies are constitutionally required to turn over a majority of the federal public lands that they manage to the individual states. The standoff lasted for 41 days and resulted in one death, and over two dozen militants were indicted on felony charges.

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pie can be a popular strategy for the parties involved, but not so attractive to taxpayers and those concerned about 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 tradeable 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 §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 under the ESA 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. Under the CAA Amendments of 1990, the sulfur dioxide trading program reduced overall emissions, but it also gave away many allowances for free to existing facilities and created profit opportunities for facilities that could reduce their emissions at low cost. Similar to 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 first three 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 environmental policy needs to pay special attention to the losers, whether they warrant compensation and, if so, what type of benefit is most appropriate.

II. Persuasion and Its Demons

These first three strategies, whether used independently or in combination, have their limits. Explicitly recognizing a class of policy losers can be politically controversial, subsidies are expensive, and flexibility in regulations may undermine policy goals. This is why environmental policy also leans heavily on the strategy of Persuasion—trying to convince those who see themselves

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on the losing side of an environmental policy zero-sum game that they are actually not, i.e., making Wright's thesis persuasive.

But persuasion has proven difficult in practice. 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* 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. Water is the medium of the zero-sum game, but counting gallons of water does not get at what groups in the system really value. Farmers care about growing crops for market; environmentalists care about the state of the aquatic ecosystem; and energy companies may care about flow for hydroelectric power. Gallons are the means to different ends, but they are the easiest metric to count.

Another obscuring factor is the multi-scalar nature of SES. 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 own 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 only big picture is a big (and unrealistic) thing to ask, particularly when it may take 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

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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. The rehabilitation of the aquatic resources and the wonderful benefits that will flow from it could take decades to materialize before 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, including in places that long ago replaced biodiversity with concrete.

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. Many of the benefits are public goods. In short, we do not have the methods to do it reliably. Biodiversity is great, but how much is it worth in dollars and cents? This problem has long stymied the integration of ecosystem services concepts into policy decisionmaking—we know that ecosystems provide valuable non-market 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 NGOs and opposed by a local farming community and its local government officials. As the interests square off, all of the factors discussed above get in the way of the appeal to nonzero-sumness: crop values versus estuary values; national versus local interests; farmers' loss of water creating diffuse benefits for people somewhere else; and all crammed on the farmers by federal regu-

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lation with no compensation. One has to be rather insensitive to expect the farmers not to suffer from a zero-sum syndrome in that story line. Indeed, it's hard to imagine anyone not feeling put upon and seeking relief. To people in this situation, the adage that there are always winners and losers in policy decisions serves as cold comfort.

III. Conclusion

Environmental policy needs to take the zero-sum mentality seriously. Pitching environmental regulation as non-zero while not practically taking into account the point that at the local scale, the regulation looks very much like a zero-sum game has led over and over to conflict, litigation, and bruised relationships. Ignoring the problem by refusing to speak of winners and losers also does not help.

The question is what environmental governance can do to better manage contexts in which the zero-sum dynamics are intensely in play. We have no silver bullet solution, but several initiatives seem worth undertaking.

First, continued development of methodologies for quantification and valuation of ecosystem services will help all participants evaluate their status using a more complete picture of the distributional economics. Saying environmental protection is an economic plus is one thing; backing the claim up with empirical evidence making the connection to the perceived losers makes for a far more powerful case against the zero-sum mentality.

Second, the discipline of adaptive management, while still working to gain practical traction outside of public land management agencies—and even in that context lacks many examples of success to date—offers potentially useful guidance in its emphasis on collaboration and experimentation. It is unlikely that zero-sum problems will be overcome without working closely with the "losers" to achieve a better framing of the dynamics and experimenting with policy options to find approaches that move the dynamics closer to nonzero-sum.

Lastly, the emerging discipline of resilience thinking, focused on building overall resilience to forces of economic, social, and environmental degradation, could be a useful replacement for the conventional environmental policy focus on improving environmental quality, which so immediately bifurcates the social and the ecological. Rather than emphasizing each person's or community's environmental, social, and economic profiles in separate ledgers, SES-scale resilience thinking takes a more holistic view that may temper the impulse to perceive zero-sumness based on economic bottom lines.

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To be sure, ecosystem services quantification, adaptive management practice, and resilience thinking, while not new on the scene, are still finding their feet. But they seem pointed in the right direction for grappling with zero-sum dynamics, and thus we would encourage further work to develop and incorporate them into environmental governance. The overarching goal should be to admit that win-win solutions are neither present nor possible in many environmental conflicts. Realizing this, and focusing on how to soften the zero-sum dynamic, are necessary first steps to change the polarizing effect of government intervention by helping all participants communicate more openly about perceived zero-sum problems and their solutions.

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