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Recommended Citation

Sanne H. Knudsen, *The Flipside of Michigan v. EPA: Are Cumulative Impacts Centrally Relevant?*, 2018 UTAH L. REV. 1 (2018), <https://digitalcommons.law.uw.edu/faculty-articles/230>

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THE FLIP SIDE OF *MICHIGAN V. EPA*: ARE CUMULATIVE IMPACTS CENTRALLY RELEVANT?

Sanne H. Knudsen*

INTRODUCTION

In the world of environmental regulation, cost and public health protection are often cast as mortal enemies, mutually dissatisfied lovers, or at least incompatible roommates. Indeed, environmental regulation often serves as the poster child for government overreach and costly regulatory burdens that are allegedly inferior to free market mechanisms.¹ This rhetoric of regulatory cost fuels passion for a deregulatory agenda.² At the same time, environmental regulation is widely acknowledged to be a necessary response to the public health externalities created

* © 2018 Sanne H. Knudsen. Thank you to the Wallace Stegner Center for selecting me to participate in the Utah Young Scholars Program and providing me the opportunity to give a public talk upon which this article is based.

¹ For a detailed scholarly account of the revival of a laissez faire approach to environmental harm, see THOMAS O. MCGARITY, *FREEDOM TO HARM: THE LASTING LEGACY OF THE LAISSEZ FAIRE REVIVAL* (2013).

² For a detailed scholarly account of the role that environment has played in perpetuating the belief that regulations adversely impact the economy, see DOES REGULATION KILL JOBS? 1–30 (Cary Coglianese et al., eds., 2013) and Alana Semuels, *Do Regulations Really Kill Jobs*, THE ATLANTIC (Jan. 19, 2017), <https://www.theatlantic.com/business/archive/2017/01/regulations-jobs/513563/> [<https://perma.cc/2UGC-B496>]. For an example of an article that pits environmental regulation against the growth of the U.S. economy without quantifying any benefits, see Dale W. Jorgenson & Peter J. Wilcoxon, *Environmental Regulation and U.S. Economic Growth*, 21 RAND J. ECON. 314, 314–15 (1990). For an example of general concerns about regulatory overreach and the use of environmental regulations to fuel that concern, see Ben Goad & Julian Hattem, *Regulation Nation: Obama Oversees the Expansion of the Regulatory State*, THE HILL (Aug. 19, 2013), <http://thehill.com/regulation/administration/317485-regulation-nation-obama-expands-the-regulatory-state> [<https://perma.cc/G8BB-DVLT>] (“Nowhere is [the use of expansionist power to enact major policy shifts] more evident than at the Environmental Protection Agency . . .”).

by an industrialized economy.³ There is no shortage of individuals criticizing government agencies for not protecting public health aggressively enough.⁴

Legal scholars have long debated the appropriate role of cost in driving environmental regulatory decisions.⁵ Much of this debate has centered on cost benefit analysis. Some scholars urge that cost benefit analysis is a rational framework for identifying “smarter lifesaving regulation.”⁶ Still, others have derided the reduction of human obligations to the natural world to a game of numbers rather than a discussion of morality.⁷ To be sure, even those that advocate for cost benefit

³ In Pew Center Survey conducted in 2016, “about three-quarters of U.S. adults (74%) said ‘the country should do whatever it takes to protect the environment,’ compared with 23% who said ‘the country has gone too far in its efforts to protect the environment.’” Monica Anderson, *For Earth Day, Here’s How Americans View Environmental Issues*, PEW RESEARCH CENTER (Apr. 20, 2017), <http://www.pewresearch.org/fact-tank/2017/04/20/for-earth-day-heres-how-americans-view-environmental-issues/> [https://perma.cc/R5CR-X7NE]. Interestingly, on the particular issue of whether regulations are necessary to encourage the use of renewable energy, Americans are more divided. See Cary Funk & Brian Kennedy, *Public Divides Over Environmental Regulation and Energy Policy*, PEW RESEARCH CENTER (May 16, 2017), <http://www.pewinternet.org/2017/05/16/public-divides-over-environmental-regulation-and-energy-policy/> [https://perma.cc/58F7-VHQN] (reporting that 54% of Americans view regulations are necessary to further energy policy); see also Victor B. Flatt, Opinion, *Environmental Law Protects Us All*, THE CHARLOTTE OBSERVER (Jan. 27, 2017), <http://www.charlotteobserver.com/opinion/op-ed/article129154869.html> [https://perma.cc/7X57-YZL8].

⁴ See, e.g., Thomas O. McGarity & Rena I. Steinzor, *The End Game of Deregulation: Myopic Risk Management and the Next Catastrophe*, 23 DUKE ENVTL. L. & POL’Y F. 93 (2012).

⁵ Compare Cass R. Sunstein, *Cost-Benefit Default Principles*, 99 MICH. L. REV. 1651, 1652 (2001) [hereinafter Sunstein, *Cost-Benefit Default Principles*] (urging that ambiguities or silences in statutory frameworks should be read as allowing agencies to consider cost), with FRANK ACKERMAN & LISA HEINZERLING, *PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING* (2005) (criticizing the influence of cost benefit analysis in social regulation on the grounds that it is politically corrupted, theoretically flawed, and morally misplaced).

⁶ See, e.g., John D. Graham, *Saving Lives Through Administrative Law and Economics*, 157 U. PA. L. REV. 395, 399–400 (2008) (asserting that the aim of cost-benefit analysis is not deregulation but really “more protection against risk at less overall cost to the private and public sectors.”).

⁷ See, e.g., Amy Sinden, *A ‘Cost-Benefit State’? Reports of Its Birth Have Been Greatly Exaggerated*, 49 ENVTL L. REP. 10933, 10956 (2016) (summarizing the criticisms of cost benefit analysis “that have been catalogued in a vast and long-standing literature”); Frank Ackerman et al., *Applying Cost-Benefit to Past Decisions: Was Environmental Protection Ever a Good Idea?*, 57 ADMIN. L. REV. 155, 157 (2005) (“The cost-benefit calculation’s attempt to assign monetary values distorts, misrepresents, and narrows the priceless values of life, health, and nature, and belittles the widespread concern for the well-being of future generations.”); Lisa Heinzerling, *Regulatory Costs of Mythic Proportions*, 107 YALE L.J. 1981, 1983 (1998) (explaining why value judgments are inherent in cost benefit analysis when, for example, deciding whether and how to discount the value of a human life); MARK SAGOFF, *THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW, AND THE ENVIRONMENT* (2d ed.

analysis as a foundation for regulatory decisionmaking acknowledge that the public health focused environmentalism of the 1970s “appears, by most accounts, to survive cost-benefit balancing, producing aggregate benefits in the trillions of dollars, well in excess of the aggregate costs.”⁸ Similarly, many champions of environmental protection recognize the virtue of cost consideration in at least some aspects of the development and implementation of environmental laws.⁹

It is against this backdrop that the Supreme Court decided *Michigan v. EPA*,¹⁰ tapping into the familiar refrain that deciding the extent to which people should tolerate living in a polluted environment is as much about cost as it is about public health. In *Michigan v. EPA*, the Court reviewed the EPA’s decision to regulate mercury emissions from power plants.¹¹ Importantly, the Clean Air Act gave the EPA authority to regulate power plant emissions that it deemed “appropriate and necessary.”¹² In deciding whether regulating mercury emissions was indeed appropriate and necessary, the EPA focused on issues of public health. The EPA took the position that it need not consider costs at the threshold level of whether to regulate.¹³ Rather, costs would be and in fact were taken into account when setting the emissions standards. The Supreme Court reviewed the EPA’s decision and held that the EPA should have considered cost when deciding whether to regulate because

2008) (explaining that economics is misguided in applying cost-benefit analysis to environmental problems); Martha C. Nussbaum, *The Costs of Tragedy: Some Moral Limits of Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1005, 1005 (Jun. 2000), <http://philosophy.uchicago.edu/faculty/files/nussbaum/The%20Costs%20of%20Tragedy.pdf> [<https://perma.cc/A7MX-SBP3>] (arguing that cost benefit analysis cannot help answer the “tragic question,” which is focused on avoiding moral wrongdoing); see also RENA I. STEINZOR, *MOTHER EARTH AND UNCLE SAM: HOW POLLUTION AND HOLLOW GOVERNMENT HURT OUR KIDS* 19–21 (2008) (arguing that an overemphasis on cost benefit analysis is responsible in part for a world where government has failed to protect children from toxic chemicals).

⁸ Sunstein, *supra* note 5, at 1657; see also *Green tape: Environmental regulations may not cost as much as governments and businesses fear*, THE ECONOMIST (Dec. 30, 2014), <https://www.economist.com/news/finance-and-economics/21637411-environmental-regulations-may-not-cost-much-governments-and-businesses> [<https://perma.cc/ET3W-RQ63>] (“[T]he new study confirms earlier findings about the impact of individual measures: ‘an increase in stringency of environmental policies does not harm productivity growth.’”).

⁹ See, e.g., Michael A. Livermore & Richard L. Revesz, *Rethinking Health-Based Environmental Standards*, 89 N.Y.U. L. REV. 1184, 1187–88 (2014) (asserting the logical need for cost as a method of identifying a limit to welfare-maximizing limit to regulation while also arguing that cost-benefit analysis can lead to more stringent regulation in some instances); cf. David M. Driesen, *The Ends and Means of Pollution Control: Toward a Positive Theory of Environmental Law*, 2017 UTAH L. REV. 57, 77–79 (2017) (describing technology based standards and their incorporation of cost as an analytical feature of environmental law but suggesting that cost benefit analysis lacks normative underpinnings in environmental law).

¹⁰ 135 S. Ct. 2699 (2015).

¹¹ *Id.* at 2704.

¹² 42 U.S.C. § 7412(n)(1)(A) (1999).

¹³ *Michigan v. EPA*, 135 S. Ct. at 2705.

cost is a “centrally relevant factor” to regulatory decisionmaking.¹⁴ Failure to consider cost, then, rendered the EPA’s decision arbitrary and capricious.

Read broadly, the decision creates a presumption that “reasonable regulation” *in general* necessitates some attention to cost.¹⁵ To some, the breadth of *Michigan* has been a cause for celebration among those who are eager to proclaim a cost benefit state.¹⁶ To others, the Court’s emphasis on cost appears to be an antienvironmental decision with adverse implications beyond the context of the case itself. At least one early commenter predicted that the decision “ha[s] the potential to impede agencies pursuing aggressive public-health and environmental agendas.”¹⁷

But the breadth of its language and the driving pragmatism that underlies its reasoning suggests an application of *Michigan* beyond cost. Taken to its logical conclusion, *Michigan* raises a more fundamental proposition worth exploring—whether there are factors besides cost that are so centrally relevant to environmental decisionmaking that failure to consider those factors renders the decision invalid. Cost, in other words, assumes a role in environmental decisionmaking for the pragmatic reason that the appetite for regulation is not endless. But cost does not drive the enterprise itself. Environmental law is a social endeavor, not an economic one. It stands to reason that there is a more fundamental purpose to environmental law that transcends the important, but surely secondary, goal of cost effectiveness.

This Article explores the flipside of *Michigan*—where the Court’s logic can just as well *support* agencies in their public health and environmental protection efforts. In particular, taking *Michigan* as a blueprint, this Article argues that cumulative impacts are centrally relevant to environmental regulation and—like cost—deserve a systemic and meaningful role in agency decisionmaking, including in the threshold decision of when to regulate. In doing so, this Article serves as a counterbalance to the weight of cost benefit rhetoric that would reduce environmental law off to a line item in a strained budget.

“Cumulative impacts” can generally be thought of as the collective consequences of human activity over space and time. The implementing regulations for the National Environmental Policy Act of 1969 (“NEPA”)¹⁸ define cumulative impacts as “the impact on the environment which results from the incremental

¹⁴ *Id.* at 2707.

¹⁵ See Cass R. Sunstein, *Cost-Benefit Analysis and Arbitrariness Review*, 41 HARV. ENVTL. L. REV. 1, 15 (2017) [hereinafter Sunstein, *Cost-Benefit Analysis*]; John D. Graham & Paul R. Noe, *A Paradigm Shift in the Cost-Benefit State*, THE REG. REV. (Apr. 26, 2016), <https://www.theregreview.org/2016/04/26/graham-noe-shift-in-the-cost-benefit-state/> [<https://perma.cc/YXS3-HY43>].

¹⁶ See Sunstein, *Cost-Benefit Analysis*, *supra* note 15, at 16; Graham & Noe, *supra* note 15.

¹⁷ *Clean Air Act–Cost-Benefit Analysis–Michigan v. EPA*, 129 HARV. L. REV. 311, 311 (2015) [hereinafter *Clean Air Act–Cost-Benefit Analysis*]; see also David M. Driesen, *Is Cost-Benefit Analysis Neutral?*, 77 U. COLO. L. REV. 335, 335 (2006) (“[T]his Article shows that CBA has almost always proven anti-environmental in practice.”).

¹⁸ 42 U.S.C. §§ 4321–4370 (2017).

impact of the action when added to other past, present, and reasonably foreseeable future actions.”¹⁹ The regulations aptly recognize that “[c]umulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”²⁰ Taking this broad definition as a guide, the concept of cumulative impacts as discussed in this Article incorporates concepts of aggregate harm and intergenerational equities. Moreover, these impacts can be additive or synergistic.

Many environmental statutes already contain provisions that embrace a cumulative impacts perspective. But because regulating through a cumulative impacts lens is more complicated than dividing regulatory decisions into discrete and disconnected choices, the most compelling parts of environmental laws—those that tackle issues of collective action directly—have been relegated to the sidelines instead of playing a central role in setting regulatory priorities or identifying areas of public health concerns. In an effort to refocus efforts in environmental regulation on real world public health and ecological problems, this Article offers a simple but important thesis: cumulative impacts are so centrally relevant to environmental and natural resources law that failure to account for those impacts when making regulatory decisions is arbitrary and capricious. In the area of water quality regulation, for example, a cumulative impacts analysis might require regulators to consider existing nonpoint and point sources of pollution before issuing or reissuing additional discharge permits in a given region. In the area of toxics regulation, a cumulative impacts lens would encourage regulators to consider risks from multiple chemicals with similar toxicity pathways (e.g. assess impacts of endocrine disruptors as a group as opposed to a series of individual chemicals). In the area of public lands management, a more aggressive cumulative impacts lens to decisionmaking might encourage regulators to better plan for the impacts of climate change on federal lands. For example, BLM land managers might consider impacts of federal lands grazing on climate change.²¹

In support of that thesis, this Article proceeds in three parts. Part I examines the Court’s reasoning in *Michigan* with the goal of creating a blueprint for deciding when a factor is “centrally relevant” to regulatory decisionmaking. Part II then shows why cumulative impacts so permeate the set of concerns embodied by environmental law that they qualify as centrally relevant factors that ought to drive

¹⁹ 40 C.F.R. § 1508.7 (2014).

²⁰ *Id.*

²¹ Jessica Wentz, *Planning for the Effects of Climate Change on Natural Resources*, 47 ENVTL. L. REP. 10,220, 10,222 (2017) (“[C]hanges in hydrologic conditions will affect the capacity of a rangeland to accommodate livestock grazing, and the risk of more intense droughts will affect the determination of what constitutes a ‘prudent and responsible’ water conservation measure.”); see also Juan Carlos Rodriguez, *Enviros Say BLM Ignores Grazing’s Effect on Climate Change*, LAW360 (Apr. 11, 2016), <https://www.law360.com/articles/782876/enviros-say-blm-ignores-grazing-s-effect-on-climate-change> [<https://perma.cc/BR6S-BQ5D>]; Mikaela S. Ellenwood et al., *Managing United States Public Lands in Response to Climate Change: A View from the Ground Up*, 49 ENVTL. MGMT. 954, *passim* (2012); M. Gill et al., *Mitigating Climate Change: The Role of Domestic Livestock*, 4 ANIMAL 323, *passim* (2010).

regulatory choices. Finally, Part III provides some examples of how focusing on cumulative impacts through the judicial review framework could reinforce the public health missions of environmental laws.²² Indeed, in the struggle to understand the impacts of a climate changed world on the availability, vulnerability, and distribution of resources, this lens of cumulative impacts will be even more critical to the mission of sustaining healthful communities.

PART I: EXAMINING THE LOGIC AND BREADTH OF *MICHIGAN V. EPA*

In *Michigan v. EPA*, the Court concluded that cost is a centrally relevant factor to regulatory decisionmaking and must therefore be considered unless Congress has directed otherwise. This Part explores whether Michigan's procost presumption is derived from precise statutory language and the technical turn of deference doctrines, or whether the Court's conclusions flow more freely from broader principles of reasonableness and relevance. In particular, this Part starts by laying out the regulatory background and describing the Court's reasoning. This Part then goes on to examine how the case has departed from previous jurisprudence and norms regarding agency deference. Finally, this Part concludes by suggesting a blueprint for its application to other foundational aspects of environmental law. In doing so, this Part lays the foundation for considering whether cumulative impacts could be rightfully identified as centrally relevant to environmental decisionmaking as a complement to cost.

A. The Regulatory History and Reasoning of Michigan v. EPA

The Clean Air Act directs the EPA to regulate hazardous air pollutants from power plants when doing so is "appropriate and necessary."²³ In 2012, the EPA adopted a final rule setting mercury and other emission standards for power plants.²⁴ The EPA explained that it had made the appropriate and necessary finding based on public health considerations of mercury exposure.²⁵ In particular, the EPA found that it was *appropriate* to regulate because mercury is a hazard to public health, and U.S. power plants are the largest domestic source of mercury emissions.²⁶ The EPA also found it *appropriate* to regulate because it had identified pollution control options

²² This Article sets aside the question of whether Michigan has actually elevated the importance of cost in judicial review. Also, the purpose of this Article is not to examine whether the Court's conclusion as to cost is correct or incorrect with respect to the Clean Air Act. Rather, this Article focuses on the broad principle introduced by the Court that there may be factors so fundamental to regulatory decisionmaking that failure to consider those factors renders the decision invalid.

²³ 42 U.S.C. § 7412(n)(1)(A) (1999).

²⁴ The Mercury Air Toxics Standards Rule, 77 Fed. Reg. 9304, 9367 (Feb. 16, 2012), *invalidated by* *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015).

²⁵ *Id.* at 9362–63.

²⁶ *Id.*

that would effectively reduce mercury emissions from power plants.²⁷ The EPA found that it was *necessary* to regulate under Section 112 because other provisions in the Clean Air Act were not adequately addressing the serious public health and environmental hazards from power plant emissions.²⁸ The EPA determined that appropriate and necessary did not require the agency to consider costs.²⁹ Those considerations would come later in the process when setting the limits of mercury emissions.

Various industry groups and states challenged the Rule based on the EPA's decision not to consider costs in the threshold issue of whether to regulate. The D.C. Circuit denied the petitions for review and upheld the Rule in its entirety.³⁰ In particular, Judge Rogers writing for the majority concluded that Section 112 "neither requires EPA to consider costs nor prohibits EPA from doing so."³¹ The court further held the EPA's construction of the ambiguous term was reasonable given that: (1) Section 112(n)(1)(A) specifically directs the EPA to make a finding based on the study regarding public health hazards from power plant emissions; (2) Congress has required the EPA to regulate other sources of pollution without considering cost; (3) Congress forbids the EPA from considering cost when deciding whether to delist source categories from hazardous air pollutants ("HAPs") regulation; and (4) for other sources Congress requires the EPA to account for cost only when setting the proper level of regulation.³² Judge Kavanaugh dissented in part, arguing that the term "appropriate" is "the classic broad and all-encompassing term that naturally and traditionally includes consideration of all the relevant factors, health and safety benefits on the one hand and costs on the other."³³ In fact, considering costs and benefits, Judge Kavanaugh argued, is "just common sense and sound government practice."³⁴ The Supreme Court granted certiorari and reversed, using broad based language and following the logic in Judge Kavanaugh's dissent.³⁵

The disagreement between the parties can be traced to the Clean Air Act's differential treatment of sources of HAPs. By way of background, when Congress adopted amendments to the Clean Air Act in 1990, it radically changed its approach to regulating hazardous HAPs such as mercury, arsenic, cadmium, hydrochloric acid, and hydrogen cyanide. Unlike previous versions of the Act, which had largely

²⁷ *Id.* at 9366.

²⁸ *Id.* at 9363.

²⁹ *Id.* at 9326–27 (explaining that it is "reasonable" to regulate mercury emissions from power plants without considering cost). In fact, the EPA made clear that its Regulatory Impacts Analysis, which it had prepared as part of the OIRA review process and which estimated costs and benefits of the proposed regulation, played no role in the "appropriate and necessary" finding. *Id.* at 9323.

³⁰ *White Stallion Energy Ctr., LLC. v. EPA*, 748 F.3d 1222, 1222–23 (D.C. Cir. 2014) (per curiam).

³¹ *Id.* at 1237.

³² *Id.* at 1236–41.

³³ *Id.* at 1266 (Kavanaugh, J., dissenting).

³⁴ *Id.* at 1259.

³⁵ *Michigan v. EPA*, 135 S. Ct. 2699, 2706–07 (2015).

failed in regulating HAPs, Congress designated 189 pollutants for which the EPA was required to develop emission standards on an expedited schedule.³⁶ The Act also required the EPA to list categories of sources that emitted pollutants above certain quantities and then regulate those sources.³⁷

Notably, the Clean Air Act separately addresses the regulation of HAPs from power plants and nonpower plants. For sources other than power plants, the Act sets up a two tiered structure whereby costs are not taken into account when the EPA is deciding whether to regulate.³⁸ Rather, the Act requires the EPA to take cost into account when deciding at what level to regulate.³⁹ For power plants, however, Congress remained silent as to cost, giving the EPA discretion to regulate HAPs from power plants if regulation was “appropriate and necessary.”⁴⁰

The EPA reasoned that Congress separated power plants out for special consideration because other newly adopted provisions of the 1990 Amendments also targeted power plant emissions and Congress was unsure the degree to which those other programs would have ancillary benefits for reducing hazardous air pollutants.⁴¹ For example, the Title IV Acid Rain Program targeted sulfur dioxide (“SO₂”) and nitrogen oxide (“NO_x”) emissions from the largest coal fired power plants but those same pollution control measures might also reduce other pollutants, including hazardous air pollutants.⁴² Given the uncertainty of what might be accomplished, Congress instructed the EPA to study the public health hazards that were reasonably anticipated to occur after other regulatory programs had been implemented.⁴³ If, based on the study, the EPA determined that regulation was appropriate and necessary, Congress directed the EPA to regulate hazardous air pollutants from power plants.⁴⁴

EPA submitted the required study (“Utility Study”) to Congress in 1998.⁴⁵ The study concluded that pollution control strategies adopted by power plants to comply

³⁶ 42 U.S.C. § 7412(b)(1) (1999).

³⁷ *Id.* § 7412(c)(1), (d)(1).

³⁸ The Act requires the EPA to regulate an “area source” if it “presents a threat of adverse effects to human health or the environment . . . warranting regulation.” *Id.* § 7412(c)(3). An area source is one that emits below a certain threshold of pollutants and thus does not automatically qualify for regulation as a major source. *Id.* § 7412(a)(1), (a)(2).

³⁹ *Id.* § 7412(d)(2) (requiring the Agency to consider cost when imposing beyond the floor standards).

⁴⁰ *Id.* § 7412(n)(1)(A).

⁴¹ Brief for the Federal Respondents at 7–8, *Michigan v. EPA*, 135 S. Ct. 2699 (2015) (Nos. 14-46, 14-47, 14-49), 2015 WL 797454 [hereinafter EPA Brief]; Brief of Industry Respondents Calpine Co., Exelon Co., National Grid Generation LLC, and Public Service Enterprise Group, Inc. at 3–4, *Michigan v. EPA*, 135 S. Ct. 2699 (2015) (Nos. 14-46, 14-47, 14-49), 2015 WL 797452 [hereinafter Industry Respondent Brief].

⁴² EPA Brief, *supra* note 41, at 7–8; Industry Respondent Brief, *supra* note 41, at 3–4.

⁴³ 42 U.S.C. § 7412(n)(1)(A).

⁴⁴ *Id.*

⁴⁵ EPA, STUDY OF HAZARDOUS AIR POLLUTANT EMISSIONS FROM ELECTRIC UTILITY STEAM GENERATING UNITS—FINAL REPORT TO CONGRESS (Feb. 1998) [hereinafter FINAL REPORT], <http://www.epa.gov/ttn/atw/combust/utilltox/eurtc1.pdf> [<https://perma.cc/PEC7->

with Title IV would not significantly reduce emissions of hazardous air pollutants.⁴⁶ In 2000, after considering the Utility Study, the EPA concluded that regulation of mercury emissions from power plants was appropriate and necessary.⁴⁷ The EPA explained that electric generating units (power plants) “are the largest source of mercury emissions in the U.S.” and that mercury poses health risks to humans and, in particular, developing fetuses.⁴⁸ The EPA also identified other metals and acid gas emissions that were of potential concern due to health impacts.⁴⁹ In 2005, the EPA reversed course and attempted to withdraw the listing.⁵⁰ That decision was struck down by the D.C. Circuit, which held that the EPA had failed to meet the delisting criteria.⁵¹ In 2012, the EPA reaffirmed the “appropriate and necessary” determination that it had made in 2000. That finding and the regulatory limits that flowed from it gave rise to the *Michigan v. EPA* litigation.⁵²

In their briefing to the Supreme Court, both parties agreed that Congress was silent as to whether cost was a required consideration under Section 112(n). But, as one would expect, the parties drew on the Act’s text, structure, and history to reach fundamentally divergent views on what Congress must have meant when it directed the EPA to regulate power plants when appropriate and necessary. There were three major lines of argument.

First, the parties disagreed on whether the breadth of the term “appropriate” constrains the EPA’s discretion or affords the EPA the freedom to treat power plants similarly to other sources. On the one hand, petitioners argued that the very breadth of the term “appropriate” signals that Congress intended the EPA to make a policy judgment based on all relevant factors and that cost is necessarily a relevant factor.⁵³ On the other hand, the EPA and Industry Respondents argued that congressional silence has never been interpreted to mean that costs must be considered.⁵⁴ By using an open ended term and by declining to set forth an exclusive list of factors, the EPA argued that Congress implicitly authorized it to determine when regulation is

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⁴⁶ *Id.* at 13-1–13-12, 13-22–13-58.

⁴⁷ Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units, 65 Fed. Reg. 79825, 79826 (Dec. 20, 2000).

⁴⁸ *Id.* at 79827–29.

⁴⁹ *Id.* at 79829.

⁵⁰ See Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. 28606, 28607–08 (May 18, 2005).

⁵¹ *New Jersey v. EPA*, 517 F.3d 574, 583 (D.C. Cir. 2008).

⁵² National Emission Standards for Hazardous Air Pollutants From Coal-and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9304, 9326 (Feb. 16, 2012).

⁵³ Brief of Petitioner Utility Air Regulatory Group, et al. at 32, *Michigan v. EPA*, 135 S. Ct. 2699 (2015) (Nos.14-46, 14-47, 14-49) 2015 WL 272372 [hereinafter Brief of UARG] (urging the Court to interpret congressional silence to consider the broadest range of relevant factors).

⁵⁴ EPA Brief, *supra* note 41, at 22, 48–51; Industry Respondent Brief, *supra* note 41, at 19.

appropriate and did not intend to tie the EPA's hands on whether cost should be considered.⁵⁵ Under the EPA's view, the broader structure of the Act shows that when Congress intended costs to be a factor it expressed that intent in clear and specific ways.⁵⁶ Similarly, other provisions governing hazardous air emissions demonstrate that, while cost is relevant to setting emissions standards for power plants, cost is not a relevant factor for determining whether to regulate as a public health matter.⁵⁷

Second, the parties disagreed on whether the Act's structure supports or refutes the EPA's approach to regulating power plants. Petitioners for the State of Michigan argue that Congress intended power plants to be treated differently, as evidenced by its creation of Section 112(n)(1)(A) to separately govern power plants.⁵⁸ As a result, they contend that Congress did not intend the EPA to follow the approach mandated for other sources.⁵⁹

The EPA argued that Congress separated power plants for special consideration because Congress was uncertain as to the degree to which hazardous air pollutants from power plants would be incidentally addressed through other programs under the Act; namely, the Title IV Acid Rain Program.⁶⁰ The EPA argued that its interpretation of the Act addressed Congress's concern and did so in a way that harmonized Section 112 by examining costs at the same stage for power plants as for other stationary sources.⁶¹ Using Congress's own regulatory structure, the EPA argued, cannot be inherently unreasonable.⁶²

Finally, Petitioner UARG argued that the EPA's interpretation cannot be reasonable because the costs of the Rule "dwarf" emission reduction benefits.⁶³ They noted that the EPA estimated that the quantifiable annual costs of compliance under the Rule are \$9.6 billion while the annual benefits from reduced emissions of hazardous air pollutants are only \$4 to \$6 million.⁶⁴ This discrepancy between the costs and the benefits, the State of Michigan argued, is "precisely the kind of unreasonable and irrational result that Congress wanted to avoid when it instructed [the] EPA to regulate only if it determined that regulation is 'appropriate.'"⁶⁵

In response, the EPA explained that it issued a cost benefit analysis of the new power plant emission standards as required by executive orders.⁶⁶ Although the cost

⁵⁵ EPA Brief, *supra* note 41, at 20.

⁵⁶ *Id.* at 35–36.

⁵⁷ *Id.* at 19, 24–26.

⁵⁸ Brief for Petitioners State of Michigan, et al. at 37–40, *Michigan v. EPA*, 135 S. Ct. 2699 (2015) (Nos.14-46, 14-47, 14-49) 2015 WL 3090902015 WL 272372 [hereinafter Michigan Brief].

⁵⁹ *Id.*

⁶⁰ EPA Brief, *supra* note 41, at 7–8.

⁶¹ *Id.* at 24–27.

⁶² *Id.* at 19.

⁶³ Brief of UARG, *supra* note 53, at 19.

⁶⁴ *Id.*

⁶⁵ Michigan Brief, *supra* note 58, at 32.

⁶⁶ EPA Brief, *supra* note 41, at 53–56.

benefit analysis played no role in its finding that regulating power plants is “appropriate and necessary,” the EPA asserted that in fact its cost benefit analysis confirmed that the EPA’s ultimate decision to regulate would be reasonable even if the agency were required to take costs into account using a cost benefit test.⁶⁷ The cost benefit analysis projected that the new standards, once fully implemented in 2016, would yield annual monetized benefits of between \$37 and \$90 billion as compared to annual costs of \$9.6 billion.⁶⁸

In support of the EPA, Industry Respondents asserted that the standards imposed by the EPA’s Rule are “economically practicable and have already been achieved by a large portion of the power sector.”⁶⁹ This, they explained, is precisely because the Act sets “minimum [emissions] standards . . . based on what other, similar sources *already* have achieved in practice—a test that necessarily ensures that standards will not impose industry-wrecking costs.”⁷⁰ And in fact, in a statement that explains the Industry Respondents support of the Rule, they maintained that “the Rule levels the playing field and eliminates the perverse incentives that previously allowed coal-fired plants to profit by refusing to install the same emission controls used by their peers.”⁷¹

Notably, the interpretation offered by the EPA would have made its approach to power plant emissions consistent with the approach that the statute otherwise sets out for other stationary sources—namely, to decide whether to regulate based on public health and then to set emissions standards with cost in mind. So, one way the Court could have resolved this case would have been through a straightforward application of the *Chevron* doctrine whereby the Court shows deference to reasonable agency interpretations in the face of statutory ambiguity.⁷² To that end, one could easily imagine the Court accepting the agency’s approach as reasonable given that Congress had followed a similar approach for nonpower plants. But that was not the approach taken. In fact, the Court showed very little inclination to defer to the EPA.

Instead of emphasizing ambiguity and deference and expertise of agencies as one might expect, the Court focused on the breadth of the term “appropriate.”⁷³ It used this breadth to open the door to relevance as the touchstone test. In particular, the Court used the language of Judge Kavanaugh in his dissenting opinion below to describe “appropriate” as “the classic broad and all-encompassing term that naturally and traditionally includes consideration of all the relevant factors.”⁷⁴ In dealing with the *Chevron* doctrine, the Court explained that an agency decision must be reasonable to warrant deference and that a decision cannot be reasonable if the

⁶⁷ *Id.* at 54–55.

⁶⁸ *Id.* at 54.

⁶⁹ Industry Respondent Brief, *supra* note 41, at 1.

⁷⁰ *Id.* at 25–26 (emphasis in original).

⁷¹ *Id.* at 30.

⁷² *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 843 (1984).

⁷³ *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015).

⁷⁴ *Id.* (quoting *White Stallion Energy Ctr., LLC v. EPA*, 748 F.3d 1222, 1266) (D.C. Cir. 2014) (Kavanaugh, J., dissenting)).

agency has failed to consider all centrally relevant factors.⁷⁵ By framing the question in this way, the Court imported the familiar arbitrary and capricious standard of review into the reasonableness inquiry of *Chevron*. Under that standard, agency decisions are arbitrary and capricious and therefore must be set aside by the reviewing court when agencies fail to consider important aspects of the problem.⁷⁶

Having established relevance as the touchstone inquiry, the Court went on to conclude that *cost* was indeed a “centrally relevant factor.”⁷⁷ In doing so, the Court explained that the phrase “appropriate and necessary” requires at least some attention to cost.⁷⁸ Appealing to something of a common sense line of argument the Court remarked: “One would not say that it is even rational, never mind ‘appropriate,’ to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits.”⁷⁹

The Court also took note of the fact that “[a]gencies have long treated cost as a *centrally relevant factor* when deciding whether to regulate.”⁸⁰ While the Court did not say so explicitly, it almost surely had in mind the Office of Information and Regulatory Affairs (“OIRA”) review process that systematically incorporates cost benefit analysis into regulatory decisionmaking.⁸¹ Against the backdrop of this established administrative practice, the Court finds that the congressional silence as to cost cannot reasonably be read as an invitation to ignore cost.⁸²

As expected, the Court does eventually look to the statute for support. Curiously, however, the detailed consideration of the statute that one has come to expect in Clean Air Act cases and that permeated the briefing in this case by parties on both sides was largely absent. Instead, the statutory examination follows rather than drives the analysis. As almost an afterthought, the Court remarks that its conclusion is consistent with the statutory context. To that end, recall that even though Section 112(n) is silent as to cost, Section 112(n) requires the EPA to study the public health hazards reasonably anticipated to occur from power plant emissions before making an appropriate and necessary finding.⁸³ As the Court recognized, that provision—the one Congress expressly intended to serve the foundation of the appropriate and necessary finding—does not mention cost.⁸⁴ However, the next provision in the statute also requires the EPA to study mercury

⁷⁵ *Id.*

⁷⁶ *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

⁷⁷ *Michigan v. EPA*, 135 S. Ct. at 2707.

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.* (emphasis added).

⁸¹ For a basic description of the role of cost-benefit analysis in the OIRA review process, see Cass R. Sunstein, Commentary, *The Office of Information and Regulatory Affairs: Myths and Realities*, 126 HARV. L. REV. 1838, 1845 (2013). For a lively examination of why the OIRA review process should be dismantled, see Rena Steinzor, *The Case for Abolishing Centralized White House Review*, 1 MICH. J. ENVTL. & ADMIN. L. 209 (2012).

⁸² *Michigan v. EPA*, 135 S. Ct. at 2707.

⁸³ 42 U.S.C. § 7412(n)(1)(A) (1999).

⁸⁴ *Michigan v. EPA*, 135 S. Ct. at 2708.

emissions from power plants, the “Mercury Study.”⁸⁵ In that Mercury Study the EPA is directed to consider health and environmental effects as well as emission control technologies and “the costs of such technologies.”⁸⁶ This, the Court concluded, evidenced Congress’s recognition of cost as a relevant consideration.⁸⁷ This is a loose connection.

B. *Michigan v. EPA as a Blueprint*

Michigan v. EPA is remarkable for three reasons that are relevant to understanding how it might serve as a blueprint for identifying other factors centrally relevant to nonarbitrary decisionmaking in environmental law.

I. *Giving Cost Presumptive Status*

First, as several scholars have noted, the case creates a pro-cost presumption.⁸⁸ That presumption is a departure from the Court’s prior opinions in this area.⁸⁹ In previous cases, notably in *Whitman v. American Trucking*,⁹⁰ the Court had expressly interpreted other provisions of the Clean Air Act to *prohibit* cost consideration in the face of congressional silence.⁹¹ Though recent cases have taken a more affirming

⁸⁵ 42 U.S.C. § 7412(n)(1)(B) (1999).

⁸⁶ *Id.*

⁸⁷ *Michigan v. EPA*, 135 S. Ct. at 2708.

⁸⁸ See Lisa Heinzerling, *The Power Canons*, 58 WM. & MARY L. REV. 1933, 1965 (2017) (arguing that *Michigan v. EPA* created a presumption); Sinden, *supra* note 7, at 10,952 (“In sum, the Court in *Michigan* reversed EPA for failing to consider costs in the face of an ambiguous statute . . . and, in doing so, arguably created a broadly application pro-cost presumption.”); Sunstein, *Cost-Benefit Analysis*, *supra* note 15, at 14 (arguing that *Michigan v. EPA* “strongly suggests that a failure to consider costs at all is per se arbitrary.”). *Cf.* Sinden, *supra* note 7, at 10,951 (acknowledging that the Court’s decision creates a pro-cost presumption, and noting that other scholars have read it that way, but taking a more tempered view: “With some reading between the lines, however, one can arguably discern in [the] opinion at least the outlines of a pro-cost presumption.”).

⁸⁹ Sinden, *supra* note 7, at 10,933–34 (“But while earlier ruling simply ratified agency decisions to consider costs, *Michigan* marks the first time the Supreme Court has actually forced cost considerations on an unwilling agency.”); Jonathan S. Masur & Eric A. Posner, *Cost-Benefit Analysis and the Judicial Role* 36 (Coarse-Sandor Working Paper Series in L. and Econ., Working Paper No. 787, 2017) (describing *Michigan* as an interpretation that “represents a significant evolution from its position in *Whitman v. American Trucking*.”).

⁹⁰ 531 U.S. 457 (2001).

⁹¹ See *id.* at 467 (“We have therefore refused to find implicit in ambiguous sections of the [Clean Air Act] an authorization to consider costs that has elsewhere, and so often, been expressly granted.”) (citing *Union Elec. Co. v. EPA*, 427 U.S. 246, 257 & n.5 (1976); see also *Am. Textile Mfrs. Inst., Inc. v. Donovan*, 452 U.S. 490, 510 (1981) (“When Congress has intended that an agency engage in cost-benefit analysis, it has clearly indicated such intent on the face of the statute.”); see also Sinden, *supra* note 7, at 10,933 n.4 (citation omitted)).

position on cost consideration within public health statutes like the Clean Air Act, the Court had only gone so far as interpreting the statute to allow the agency to consider cost.⁹² Allowing agencies to consider cost remains a far cry from requiring agencies to consider cost even when Congress has not spoken to the issue. Still, both the majority and dissent endorse *Michigan's* conclusion that cost is an indispensable consideration.⁹³ The difference, of course, is that the dissent argued that the EPA *had* considered cost, just at a later stage.⁹⁴

Scholars debate the significance of the Court's departure in *Michigan* for what it means in terms of the future of cost benefit analysis.⁹⁵ Professor Cass Sunstein argues that the reach of the procost presumption might seem "quite modest" but that "it is far less so than it might appear."⁹⁶ Sunstein urges that the consideration of cost "requires agencies to weigh costs against benefits, at least in some sense."⁹⁷ Of note, Sunstein has long advocated for a more central role of cost benefit analysis in the regulatory state and argued that courts have applied and should continue to apply procost interpretative cannons.⁹⁸

Professor Amy Sinden, however, cautions against conflating a procost position with the embrace of formal cost benefit analysis.⁹⁹ She explains "both the majority and the dissent took pains to make clear that they were not requiring agencies 'to conduct a formal cost-benefit analysis in which each advantage and disadvantage is assigned a monetary value.'"¹⁰⁰ The reason why one should be careful not to conflate a presumption in favor of cost consideration and a presumption in favor of formal cost benefit analysis, Sinden further explains, is the myriad of shortcomings with the ability of cost benefit analysis to capture social public health values at the core of environmental law.¹⁰¹

For purposes of this Article, the particular contours or resolution of the Sinden-Sunstein debate is not as important as the general consensus among scholars that the Court did in fact recognize cost as a centrally relevant factor *even in the face of*

⁹² See *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 226 (2009) (upholding the EPA's use of cost benefit analysis, though not requiring it).

⁹³ *Michigan v. EPA*, 135 S. Ct. 2699, 2716–17 (2015) (Kagan, J., dissenting) ("Cost is almost always a relevant—and usually, a highly important—factor in regulation. Unless Congress provides otherwise, an agency acts unreasonably in establishing a standard-setting process that ignores economic considerations.") (internal quotation marks omitted) (citation omitted).

⁹⁴ See *id.*

⁹⁵ Compare Sinden, *supra* note 7, with Sunstein, *supra* note 15.

⁹⁶ Sunstein, *Cost-Benefit Analysis*, *supra* note 15, at 14.

⁹⁷ *Id.*

⁹⁸ See Sunstein, *Cost-Benefit Default Principles*, *supra* note 5, at 1655 ("[T]here can be no doubt that the cost-benefit default principles have emerged as a central part of what amounts to the federal common law of regulatory policy."); see also CASS R. SUNSTEIN, *THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION* (2002).

⁹⁹ See generally Sinden, *supra* note 7, at 10,934 (explaining there is a "fairly wide gulf between" the Court's pro-cost posture and a formal cost benefit analysis).

¹⁰⁰ *Id.*

¹⁰¹ *Id.* at 10,956.

congressional silence. This presumptive nature of the Court's conclusion raises the possibility that there are other relevant factors that too are so central to nonarbitrary decisionmaking that they can be required in the face of congressional silence. For that reason, the Court's departure from previous cases is remarkable.

2. *Dispensing with Deference*

In addition to its procost position, *Michigan* is also remarkable for its decidedly lukewarm attitude towards agency deference. Because the case turns on an issue of statutory interpretation, the issue of how much deference to afford the EPA is resolved under the familiar two step framework announced in under *Chevron U.S.A. Inc. v. Natural Resources Defense Council*.¹⁰² Under that framework, courts begin by asking whether Congress has spoken to the particular statutory issue.¹⁰³ If it has, that is the end of the matter for the courts must follow the intent of Congress.¹⁰⁴ If Congress has not spoken to the issue—put differently, if the statute is ambiguous—courts proceed to the second step of the analysis and ask if the agency's interpretation is reasonable.¹⁰⁵ Here, because the statute was silent as to consideration of cost, and congressional intent was otherwise unclear, the Court appears to have grappled with the reasonableness of the agency's interpretation under step two of *Chevron*.¹⁰⁶

Ordinarily, agencies enjoy an impressively high victory rate under step two of the *Chevron* framework.¹⁰⁷ Some empirical studies from the 1990s have shown that agencies win 89% of the time under a step two analysis.¹⁰⁸ In a relatively uncommon

¹⁰² 467 U.S. 837, 843 (1984).

¹⁰³ *Id.* at 841–43.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.* at 843.

¹⁰⁶ See *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015) (recognizing that agencies deserve deference when interpreting ambiguous statutory provisions but that they still “must operate within the bounds of reasonable interpretation.”).

¹⁰⁷ See, e.g., Kristin E. Hickman & Matthew B. Krueger, *In Search of the Modern Skidmore Standard*, 107 COLUM. L. REV. 1235, 1276–77 (2007) (discussing and assembling the literature on the high rate of success of government litigants under *Chevron*, *Skidmore*, and more generally). Cf. William N. Eskridge, Jr. & Lauren E. Baer, *The Continuum of Deference: Supreme Court Treatment of Agency Statutory Interpretations from Chevron to Hamdan*, 96 GEO. L.J. 1083, 1090 (2008) (presenting empirical work suggesting that discerning deference patterns may be the work of a more complicated set of nuanced factors that cannot be adequately captured by simple calculations of success rates, like, for example, the court's decision to invoke a deference doctrine at all).

¹⁰⁸ See Orin S. Kerr, *Shedding Light on Chevron: An Empirical Study on the Chevron Doctrine in the U.S. Courts of Appeals*, 15 YALE J. ON REG. 1, 31 (1998) (citing an 89% success rate at step two in a study of all federal courts of appeals in 1995 and 1996); Christopher H. Schroeder & Robert L. Glicksman, *Chevron, State Farm and the EPA in the Courts of Appeals During the 1990s*, 31 ENVTL. L. REP. 1, 15 (2001) (finding about a 92% success rate at step two in the 1990s in the courts of appeals); see also Patricia M. Wald, *A Response to Tiller and Cross*, 99 COLUM. L. REV. 235, 243 (1999) (discussing a study of the

move, however, *Michigan* struck down the agency's interpretation as being unreasonable.¹⁰⁹ Some scholars and lower courts have taken the Court's behavior to signal the *Chevron* doctrine's erosion, or at the very least an invitation to take a more searching review under step two.¹¹⁰ The Court's examination and conclusion in step two does look an awful lot like a step one analysis. The majority makes clear there is no room for a contrary interpretation: "Read naturally in the present context, the phrase 'appropriate and necessary' requires at least some attention to cost. One would not say that it is even rational, never mind 'appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits."¹¹¹ If, as the Court concludes, it is not even rational to interpret the Clean Air Act in the way the EPA proposed, one would be hard pressed to see how the Court would accept another interpretation as reasonable.¹¹² Indeed, Justice Scalia observed that "[o]ne does not need to open up a dictionary" to reach that conclusion.¹¹³ This kind of firm position on what the statute requires is typically the hallmark of step one cases, which is sometimes framed as charging judges with discerning whether there is a singular permissible interpretation prescribed by Congress.¹¹⁴

D.C. Circuit reporting that only 11% of reversals of agency decisions occur at step two of *Chevron*).

¹⁰⁹ *Michigan v. EPA*, 135 S. Ct. at 2708.

¹¹⁰ See, e.g., *Gutierrez-Brizuela v. Lynch*, 834 F.3d 1142, 1154 (10th Cir. 2016) (Gorsuch, J., concurring) (citing *Michigan v. EPA* as lever to question agency deference); *Synopsys, Inc. v. Mentor Graphics Corp.*, 814 F.3d 1309, 1332 (Fed. Cir. 2016) (Newman, J., dissenting) (citing to *Michigan v. EPA* as he advocated for taking a harder look at agency decisions under step two of *Chevron*); *NRDC v. EPA*, 808 F.3d 556, 569 (2d Cir. 2015) (relying on *Michigan v. EPA* to set up a more searching review of an agency's statutory interpretation and alleged failure to consider relevant factors); Heinzerling, *supra* note 88, at 1943 (citing *Michigan v. EPA* in a group of cases that "suggest that at least several justices are in a bad mood about *Chevron*, and for that reason alone these cases may portend more trouble ahead for administrative interpretations."); Connor Schratz, *Michigan v. EPA and the Erosion of Chevron Deference*, 68 ME. L. REV. 381, 394–96 (2016); see also Thomas A. Lorenzen & Sharmistha Das, *The Decline of Deference: Is the Supreme Court Pruning Back the Chevron Doctrine*, 47 TRENDS (ABA Section of Env't, Energy and Resources, Chi., Ill.), Sept.–Oct. 2015 at 3 (suggesting the approach to *Chevron* is here to stay but is being substantially "prune[d]" by the Supreme Court).

¹¹¹ *Michigan v. EPA*, 135 S. Ct. at 2707.

¹¹² Even though this case functions like a Step One case—whereby the opinion leaves no room for a contrary, nonarbitrary interpretation—the Court was correct to approach this case under Step Two given that the Court's procost conclusion was derived more from generalized principles than the statute itself. *Id.* In other words, the Court would have been hard-pressed to couch this decision in terms of congressional intent, which is the inquiry that lies at the heart of the Step One. *Id.*

¹¹³ *Id.*

¹¹⁴ See *Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 982–85 (2005) ("A court's prior judicial construction of a statute trumps an agency construction otherwise entitled to *Chevron* deference only if the prior court decision holds that its construction follows from the unambiguous terms of the statute and thus leaves no room for

One reason why the Court's decision approaches the conviction of a step one analysis could be because the Court imports the arbitrary and capricious standard of review into the step two inquiry. In doing so, the Court sheds the bounded scriptures of agency deference and considers relevance as judged by less technical standards. In other words, by importing arbitrary and capricious review into the step two analysis, the Court is able to shed the norms of agency deference under step two and the theoretical underpinnings of *Chevron* that give agencies power to fill policy gaps left by Congress.¹¹⁵ Arbitrary and capricious review is not so constrained and has a simpler aim of ensuring agencies wield their power with reason and transparent rationales.¹¹⁶ Leading administrative law scholar Thomas Merrill long ago observed that the *Chevron* doctrine "allows courts to retreat into an apolitical, law finding function" whereas arbitrary and capricious review "seems to inject them in the middle of the policymaking process."¹¹⁷

agency discretion. This principle follows from *Chevron* itself."); *How Chevron Step One Limits Permissible Agency Interpretations: Brand X and the FCC's Broadband Reclassification*, 124 HARV. L. REV. 1016 (2011). Cf. Matthew C. Stephenson & Adrian Vermeule, *Chevron Has Only One Step*, 95 VA. L. REV. 597, 605 (2009) (arguing that a narrow construction of step one is detrimental "insofar as judges believe that Step One requires them to ascertain whether the statute has a single, clear meaning before deciding whether the agency's interpretation is reasonable, the two-step structure may actually undermine some of the values that *Chevron* deference is supposed to advance.").

¹¹⁵ *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 843–44 (1984); *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125 (2016) ("A premise of *Chevron* is that when Congress grants an agency the authority to administer a statute by issuing regulations with the force of law, it presumes the agency will use that authority to resolve ambiguities in the statutory scheme.").

¹¹⁶ See Kathryn A. Watts, *Proposing a Place for Politics in Arbitrary and Capricious Review*, 119 YALE L.J. 2, 16–17 (2009) (explaining that "various prominent judges on the D.C. Circuit crafted a ramped up version of 'arbitrary and capricious' review—called 'hard look' review—that enabled courts to scrutinize agency decisions and to ensure that the public interest was being served" and that the Supreme Court embraced this approach in *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins.*, 463 U.S. 29 (1983)); Reuel E. Schiller, *Enlarging the Administrative Polity: Administrative Law and the Changing Definition of Pluralism, 1945–1970*, 53 VAND. L. REV. 1389, 1421–23 (2000) (explaining that the various hard look decisions in the 1960s and 1970s "indicated the degree to which fears of agency capture and a general suspicion of the administrative process drove intense judicial review."); Thomas W. Merrill, *Capture Theory and the Courts: 1967–1983*, 72 CHI.-KENT L. REV. 1039, 1052 (1997) ("[C]apture theory also suggests that aggressive judicial oversight and control of agencies is needed in order to counteract the distortions of the administrative process introduced by interest group capture and other pathologies.").

¹¹⁷ Merrill, *supra* note 116, at 1096. See also Patrick M. Garry, *The Unannounced Revolution: How the Court Has Indirectly Effected a Shift in the Separation of Powers*, 57 ALA. L. REV. 689, 711 (2006) ("[T]he Hard-Look Doctrine permits the courts to intrude into agency action much more than they could ever intrude into the workings of Congress."); Richard J. Pierce, Jr., *The Appropriate Role of Courts in Environmental Regulation*, 54 ADMIN. L. REV. 1237, 1264 (2002) ("Extensive empirical research has documented the existence of a powerful tendency for judges to act in accordance with their partisan political

In addition, by importing arbitrariness review into *Chevron* step two, the Court gains access to a wide range of moods that characterize arbitrary and capricious review—some deferential and some much less so. To that end, arbitrary and capricious standard of review does not impose a one size fits all degree of deference.¹¹⁸ In *Citizens to Pres. Overton Park, Inc. v. Volpe*,¹¹⁹ one of the leading cases to define the arbitrary and capricious standard, the Supreme Court at the same time describes the standard of review as “narrow” while also as “searching and careful.”¹²⁰ This formulation allows courts to take a range of approaches, depending on the skepticism with which the court sees the agency’s position. For example, at times courts display an eager willingness to defer to agency expertise by invoking the useful mantra that “a court is not to substitute its judgment for that of the agency.”¹²¹ Similarly, those with a penchant for deference might also elect to “uphold a decision of less than ideal clarity if the agency’s path may reasonably be discerned.”¹²² On the other hand, those harboring a more skeptical view, of agencies generally or of the outcome in particular, could hang a decision of less than ideal clarity out to dry by refusing to “supply a reasoned basis for the agency’s action that the agency itself has not given.”¹²³ These competing mantras provide a sort of choose-your-own-adventure within the world of agency deference and arbitrariness review.¹²⁴ By framing reasonableness as a question of arbitrariness and thus

preferences when they apply that version of the arbitrary and capricious test to the EPA’s actions.”); cf. Jonathan Cannon, *The Sounds of Silence: Cost-Benefit Canons in Entergy Corp. v. Riverkeeper, Inc.*, 34 HARV. ENVTL. L. REV. 425, 448 (2010) (arguing that collapsing the two steps of the *Chevron* inquiry broadens the scope of judicial review).

¹¹⁸ See Sidney A. Shapiro & Richard E. Levy, *Judicial Incentives and Indeterminacy in Substantive Review of Administrative Decisions*, 44 DUKE L.J. 1051, 1065–66 (1995) (“[T]he arbitrary and capricious standard is relatively open-ended, and the Supreme Court has not given it more precise content.”); see also Louis J. Virelli III, *Deconstructing Arbitrary and Capricious Review*, 92 N.C. L. REV. 721, 728, 733 (2014) (stating that the Supreme Court has “applied the concept of arbitrariness differently in a wide range of cases” and positing that the standard is in fact “multidimensional”).

¹¹⁹ 401 U.S. 402 (1971).

¹²⁰ *Id.* at 416.

¹²¹ *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 513 (2009) (quoting *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins.*, 463 U.S. 29, 43 (1983) (internal quotation marks omitted)).

¹²² *Id.* at 513–14 (quoting *Bowman Transp., Inc. v. Ark.-Best Freight System, Inc.*, 419 U.S. 281, 286 (1974) (internal quotation marks omitted)).

¹²³ *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2127 (2016) (vacating the agency’s decision after finding the agency’s reasoning inadequate and admonishing that “[i]t is not the role of the courts to speculate on reasons that might have supported an agency’s decision”).

¹²⁴ See *Am. Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 248 (D.C. Cir. 2008) (Kavanaugh, J., concurring in part and dissenting in part) (explaining that the “[a]pplication of the beefed-up arbitrary-and-capricious test is inevitably if not inherently unpredictable—so much so that, on occasion, the courts’ arbitrary-and-capricious review itself appears arbitrary and capricious”); see also Adam Babich, *Fun with Administrative Law: A Game for*

relevance, the Court in *Michigan* uncuffed itself and was free to adopt a more skeptical attitude towards agency deference.¹²⁵

Michigan is certainly not the first time that courts merged reasonableness under *Chevron's* step two with the arbitrary and capricious standard.¹²⁶ Scholars have long debated the wisdom of doing so.¹²⁷ But while the approach is not new, *Michigan* inspires some useful observations. For one, it illustrates that there is sufficient flexibility in the administrative law frameworks for courts to approach statutory ambiguities with a measure of context, common sense, and pragmatism.¹²⁸ It

Lawyers and Judges, 4 MICH. J. ENVTL. & ADMIN. L. 341, 349–53 (2015) (collecting cases in tabular form to show that for every guiding principle of administrative law, there is contrasting principle that can be used to urge an opposite result).

¹²⁵ See Merrill, *supra* note 116, at 1040 (arguing that the emergence of the hard look doctrine as a characterization of arbitrariness review was part of a larger series of doctrinal transformations that shifted power from agencies to courts); Richard J. Pierce, Jr., *What Do the Studies of Judicial Review of Agency Actions Mean?*, 63 ADMIN. L. REV. 77, 97 (2011) (“I now share the view of many scholars that courts will never announce a doctrine that cannot accommodate the powerful tendency of judges and Justices to act in ways that are consistent with their strongly held political and ideological perspectives.”). But see Jack M. Beermann, *End the Failed Chevron Experiment Now: How Chevron Has Failed and Why It Can and Should Be Overruled*, 42 CONN. L. REV. 779, 784 (2010).

¹²⁶ See Kenneth A. Bamberger & Peter L. Strauss, *Chevron's Two Steps*, 95 VA. L. REV. 611, 621 (2009) (“Courts and commentators have converged on an emerging consensus that the ‘arbitrary, capricious, and abuse of discretion’ standard set forth in [the Administrative Procedure Act’s (APA)] Section 706(2)(A) supplies the metric for judicial oversight at *Chevron's* second step.”); *Judulang v. Holder*, 565 U.S. 42, 52 n.7 (2011) (suggesting that the arbitrary and capricious standard of review and the *Chevron* step two analysis are “the same”); *Nat’l Ass’n of Regulatory Util. Comm’rs v. ICC*, 41 F.3d 721, 727 (D.C. Cir. 1994) (noting that “the inquiry at the second step of *Chevron* overlaps analytically with a court’s task under the [APA] . . . in determining whether agency action is arbitrary and capricious (unreasonable).”) (citation omitted); see also *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125 (2016) (weaving together the *Chevron* framework and arbitrariness review by explaining that a procedurally flawed rule cannot get *Chevron* deference and that a rule is flawed when the agency has failed to give adequate explanations of its decision).

¹²⁷ See, e.g., Cass R. Sunstein, *Law and Administration After Chevron*, 90 COLUM. L. REV. 2071, 2105 (1990) (noting that *Chevron's* “reasonableness inquiry should probably be seen as similar to the inquiry into whether the agency’s decision is ‘arbitrary’ or ‘capricious’ within the meaning of the APA”); cf. Beermann, *supra* note 125, at 782–84 (describing how “the *Chevron* doctrine has failed” on multiple grounds including lack of clarity and inadequate theoretical foundation). Compare Stephenson & Vermeule, *supra* note 114, at 604 (suggesting that conflation of arbitrariness review and the reasonableness inquiry is not a good idea and that instead *Chevron* should be reduced to a single step), with Ronald M. Levin, *The Anatomy of Chevron: Step Two Reconsidered*, 72 CHI.-KENT L. REV. 1253, 1276 (1997) (urging that “the D.C. Circuit’s strenuous efforts to divide up the terrain between arbitrariness review and *Chevron* step two should be abandoned; the court, as well as other courts, would do better simply to treat these two modes of analysis as equivalent”).

¹²⁸ For an empirical pathway to a similar conclusion, see Eskridge, Jr. & Baer, *supra* note 107, at 1090 (“[O]ur most striking finding is that in the majority of cases—53.6% of

particularly shows the flexibility at the interface between *Chevron*'s reasonableness inquiry and the arbitrariness review. Another, slightly different, way to cast this flexibility is to observe that the outcome in *Michigan* does not depend on the administrative law frame—that factors which are presumptively indispensable to nonarbitrary decisionmaking must be considered regardless of whether the case is cast as step one, step two. Either way, this flexibility is useful to bear in mind when considering whether there is room for courts to recognize other centrally relevant factors, beyond cost.

3. *Embracing a Nontechnical Explanation and Generalized Application*

The third aspect of *Michigan v. EPA* that makes it a remarkable case is the nontechnical nature of its analysis. To that end, the Clean Air Act is a notoriously complex statute and issues of statutory interpretation are usually a delicate parsing of text to ascertain nuanced insight into congressional intent.¹²⁹ But that is not the approach that the Court took in deciding whether Congress was clear, or the agency was reasonable. Rather, in reaching its conclusion, the Court invoked generalized appeals to rationality more than the usual intricacies of textual analysis and statutory interpretation. The Court sought only a loose statutory connection to justify its broader reaching statement of regulatory policy. Only after concluding that cost must be considered when the statute is “read naturally,” that the agency has long recognized cost as a centrally relevant factor, and that a contrary reading would be unreasonable, only then does the Court venture beyond the phrase “appropriate and necessary” to consider its broader statutory context. Indeed, in stating that “the statutory context reinforces the relevance of cost,” the Court leaves the distinct impression that the statutory context is playing second fiddle to more generalized principles of relevance.

them—the Court does not apply any deference regime at all. Instead, it relies on ad hoc judicial reasoning of the sort that typifies the Court’s methodology in regular statutory interpretation cases.”); see also Thomas W. Merrill, *Textualism and the Future of the Chevron Doctrine*, 72 WASH. U. L. Q. 351, 359 (1994) (“I found that the Court applied the *Chevron* framework to less than half the cases that presented a question of deference”); Linda Jellum, *Chevron’s Demise: A Survey of Chevron from Infancy to Senescence*, 59 ADMIN. L. REV. 725, 738 (2007) (noting that “[d]eference was based on pragmatism” under pre-*Chevron* deference frameworks like *Skidmore*). Professor Jellum argues that *Chevron* “shifted the basis for deference from pragmatism to implied congressional delegation and democratic theory.” *Id.*; cf. David Zaring, *Rule by Reasonableness*, 63 ADMIN. L. REV. 525, 526–28 (2011) (contending that the court ought to adopt a uniform rule of reasonableness in place of specific review doctrines of agency action).

¹²⁹ For a case in which the Supreme Court approaches an issue of statutory interpretation under the Clean Air Act in marked contrast to *Michigan*, see *EPA v. EME Homer City Generation*, 134 S. Ct. 1584 (2014). In that case the Court started with a detailed textual analysis and then admonished the lower court for allowing pragmatism to rewrite the text. See *id.* at 1601 (“The practical difficulties cited by the Court of Appeals do not justify departure from the Act’s plain text.”).

Prominent scholars have commented on the common sense approach taken by the Court in *Michigan v. EPA*.¹³⁰ Professor Lisa Heinzerling goes so far as to proclaim the analysis “scarcely a legal argument at all.”¹³¹ She notes that the opinion was not rooted in “predictions about congressional behavior or preferences. It is an argument based on the Justices’ own judgments about sensible regulatory policy.”¹³²

Notably, the Court’s analysis is not only nontechnical, but it is also generalizable. In other words, a broad reading of the case would make it applicable beyond the confines of the Clean Air Act.¹³³ To that end, Sunstein describes the conclusion of the Court as “quite general and not limited to a particular provision of the Clean Air Act.”¹³⁴ And while Sunstein acknowledges that it would be possible to understand the holding as limited to the statute, he cautions “that would be a mistake.”¹³⁵ To the extent that the opinion crosses statutory borders and identifies cost as a commonly shared aspect of rational decisionmaking, some commenters have noted that it is unusual.¹³⁶

* * *

In its simplest form, *Michigan v. EPA* sheds the usual niceties of deferring to agencies in the face of ambiguity on the grounds that cost is an indispensable part of nonarbitrary decisionmaking. *Michigan*’s procost presumption, importation of an arbitrary and capricious review, and its common sense approach to relevance tells a story where deference to agency interpretation does not trump the pragmatic role that the judiciary plays in identifying the backbone of rational decisionmaking. It

¹³⁰ See Daniel A. Farber, *Taking Costs into Account: Mapping the Boundaries of Judicial and Agency Discretion*, 40 HARV. ENVTL. L. REV. 87, 108 (2016) (“The Justices seemed to find the relevance of cost to be merely a matter of common sense, requiring no explanation.”); Heinzerling, *supra* note 88, at 1985 (“[T]he *Michigan* canon appears not to turn on specific statutory language. Justice Scalia offered it as a general principle of rational agency decision-making”); Sinden, *supra* note 7, at 10,951 (describing a broad read of *Michigan v. EPA* as an assemblage of “links” between “cost consideration, long-standing agency practice, and rationality.”).

¹³¹ Heinzerling, *supra* note 88, at 1968.

¹³² *Id.*

¹³³ Compare the breadth of the holding in *Michigan v. EPA* with *Whitman v. Am. Trucking Ass’n*, 531 U.S. 457 (2001), another Justice Scalia opinion involving consideration of cost under the Clean Air Act in which the anticost presumption was specifically limited to the statutory provision at issue.

¹³⁴ Sunstein, *supra* note 15, at 15. Similarly, Professor Heinzerling characterizes the generalizable principles created in *Michigan v. EPA* as an ideologically driven “power canon” that will “almost inevitably, be unpredictable in application.” Heinzerling, *supra* note 88, at 1985.

¹³⁵ Sunstein, *Cost-Benefit Analysis*, *supra* note 15, at 15.

¹³⁶ See *Clean Air Act—Cost-Benefit Analysis*, *supra* note 17, at 311–20 (“The Court has never before held that one particular factor is ‘relevant’ or ‘an important aspect of the problem’ in every case. Rather, the Court has evaluated regulatory decisions holistically and contextually, based on each agency’s particular statutory mandate and reasoning process.”).

also tells a story where the reasoning is drawn less from the precise statutory context and more from general principles and common sense.

Taking *Michigan v. EPA* to its logical conclusion and fully respecting the goal of rational decisionmaking, one might ask whether there are other centrally relevant factors that are indispensable to regulatory decisionmaking in environmental law. In considering the answer to that question, the following set of guideposts might prove useful:

- First, centrally relevant factors work across statutory borders and are common to a broad enterprise of rational decisionmaking.
- Second, a highly technical or rigid reading of a particular statute does not drive the identification of a centrally relevant factor. Relatedly, congressional silence does not preclude the creation of a presumptively required factor.
- Third, pragmatism and common sense have a guiding role in identifying centrally relevant factors. Their existence is bolstered by a pattern of agency practice.

PART II: MAKING THE CASE FOR CUMULATIVE IMPACTS AS CENTRALLY RELEVANT

Cumulative impacts—that is, the public health and ecological consequences of collective action over time and space—lie at the heart of the problems that Congress set out to solve when it adopted the body of statutes that make up environmental law. In fact, so pervasive is the pattern of congressional concern for cumulative impacts and so foundational is the consideration of cumulative impacts to the understanding of regulatory utility that cumulative impacts, like costs, are a centrally relevant factor in environmental decisionmaking. If this is true, under the logic of *Michigan*, cumulative impacts must be meaningfully considered in order for regulatory decisions to be valid (unless Congress has expressly disavowed the consideration of cumulative impacts in a particular setting).

To make the case for cumulative impacts as a centrally relevant factor, this Part starts with an examination of how the study of interrelationships between living beings and their abiotic environment drives the environmental sciences. This Part goes on to consider how this driving question and universally accepted scientific principle is embodied in the major environmental statutes. Together, the science and the law point to a simple but important conclusion: understanding how regulatory frameworks further the goal of preserving the healthful interconnectivity of humans and their environment is, therefore, in many ways even more foundational to environmental decisionmaking than cost.

*A. Interconnectivity as the Scientific Foundation for Environmental Law:
“Let’s start at the very beginning. A very good place to start.”¹³⁷*

The most basic place to begin this line of logic is with the very simple observation that people and land are connected. Individual actions are connected in time and space. In fact, understanding of this connectivity is the basis for numerous scientific fields including ecology,¹³⁸ physiology,¹³⁹ and environmental science.¹⁴⁰ These fields are based on the clear understanding, and empirical demonstration, that life, and the environment in which it thrives, stems from complex and dynamic connections among living and nonliving systems.

Cataloging the myriad interrelationships that drive life on Earth would be impossible. A few examples, however, can help highlight the importance of understanding environmental systems and relationships, not singular impacts considered in isolation.

1. Climate Change

Climate change provides several lessons about the interlinked nature of planetary systems. For example, consider how the land is connected to the atmosphere through carbon sequestration. The integrity of the land systems like forest, soil, and peatlands can influence the amount of carbon dioxide that is absorbed from or released into the atmosphere.¹⁴¹ When these ecosystems are

¹³⁷ RICHARD RODGERS, *Do-Re-Mi Lyrics*, in *THE SOUND OF MUSIC* (Rodgers and Hammerstein 1959).

¹³⁸ See *What does ecology have to do with me?*, ECOL. SOC’Y AM., <https://www.esa.org/esa/education-and-diversity/what-does-ecology-have-to-do-with-me/> [<https://perma.cc/2H4P-GBW2>] (“Ecology is the study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them.”).

¹³⁹ *What is Physiology?*, AM. PHYSIOLOGICAL SOC’Y, <http://www.the-aps.org/mm/Careers/Ugrad/What-is-Physiology> [<https://perma.cc/DDV4-2AMZ>] (“Physiology is the study of life, specifically, how cells, tissues, and organisms function. Physiologists are constantly trying to answer key questions in areas ranging from the functions of single cells to the interactions between human populations and our environment . . .”).

¹⁴⁰ *What is Environmental Science?*, ENVTL. SCI., <http://www.environmentalscience.org/> [<https://perma.cc/47LH-BQA6>] (“Environmental science is the study of the effects of natural and unnatural processes, and of interactions of the physical components of the planet on the environment.”).

¹⁴¹ Todd A. Ontl & Lisa A. Schulte, *Soil Carbon Storage*, NATURE EDU. KNOWLEDGE PROJECT (2012), <https://www.nature.com/scitable/knowledge/library/soil-carbon-storage-84223790> [<https://perma.cc/XU53-CPZV>]; R. Lal, *Soil Carbon Sequestration Impacts on Global Climate Change and Food Security*, 304 SCI. MAG. 1623, 1625–26 (June 11, 2004) (identifying the pathways to carbon sequestration and flux across the globe and discusses the potential for changing land use approaches for reducing atmospheric carbon emission and climate change, as well as increasing food security); R. A. Houghton & J. L. Hackler,

converted to agriculture and pasture lands, their capacity for carbon sequestration is reduced. The carbon that could otherwise have been sequestered is instead released into the atmosphere, contributing to climate change.

As another example, ocean acidification shows how water and air systems are connected. To that end, increasing atmospheric carbon causes increasing ocean temperatures, which in turn results in increasing acidity of seawater.¹⁴² This acidity can have widespread effects on sea creatures, which in turn would adversely impact biodiversity and commercial harvests. The most obviously and directly affected species are those that rely on carbonate structures like corals and shellfish; but because corals are home to a great number of marine species, acidification is expected to affect a wide range of organisms.¹⁴³

2. *Environmental Chemicals*

For another complex set of lessons about the human influence on ambient environmental conditions and living systems, consider the impacts of the Chemicals Age on the environment. It is no secret that chemicals are everywhere as a result of consumer products, pesticides, and industrial waste.¹⁴⁴ The release of chemicals into the environment by multiple parties from multiple sources over time results in the uptake of those chemicals by numerous species.¹⁴⁵ And that uptake has physiological consequences.¹⁴⁶ In fact, as a reminder that life often comes full circle,

Changes in Terrestrial Carbon Storage in the United States I: The Roles of Agriculture and Forestry, 9 GLO. ECOLOGY & BIOGEOGRAPHY 125, 125, 136 (2000) (using a model that incorporates change in land use primarily from forest to cropland over 200 years in the United States to estimate changes in carbon emissions resulting from loss or gain of carbon sequestration).

¹⁴² Scott C. Doney et al., *Ocean Acidification: The Other CO₂ Problem*, 1 ANN. REV. MARINE SCI. 169, 169 (2009) (“The process of ocean acidification is well documented in field data, and the rate will accelerate over this century unless future CO₂ emissions are curbed dramatically.”).

¹⁴³ *Ocean Acidification*, SMITHSONIAN OCEAN PORTAL (2016), <http://ocean.si.edu/ocean-acidification> [<https://perma.cc/JU58-AUUM>].

¹⁴⁴ For a discussion of policy implications of chemicals proliferation, see Sanne H. Knudsen, *Regulating Cumulative Risk*, 101 MINN. L. REV. 2313, 2382–95 (2017).

¹⁴⁵ See Frances Orton & Charles R. Tyler, *Do Hormone-modulating Chemicals Impact on Reproduction and Development of Wild Amphibians?*, 90 BIOL. REV. 1100 (2015) (summarizing the impacts of endocrine disrupting chemicals on a wide range of organisms); Sergio Manzetti et al., *Chemical Properties, Environmental Fate, and Degradation of Seven Classes of Pollutants*, 27 CHEMICAL RES. IN TOXICOLOGY 713, 724 (2014) (discussing biological effects of common pollutants and noting they are indicated widely as affecting reproductive systems and acting as carcinogens).

¹⁴⁶ See Orton & Tyler, *supra* note 145, at 1101–02; Manzetti et al., *supra* note 145, at 724; Kjell Einar Erikstad et al., *High Levels of Organochlorines May Affect Hatching Sex Ratio and Hatching Body Mass in Arctic Glaucous Gulls*, 25 FUNCTIONAL ECOLOGY 289, 289–95 (2011) (reporting the results of a field study indicating that female organochlorine levels impact the sex ratios of their offspring. If a mother has high organochlorine levels she

some toxins bioaccumulate in the tissues of predator species and are later consumed by humans.¹⁴⁷ For example, mercury emissions by power plants followed by mercury accumulation in fish followed by the concomitant advisory warnings regarding human consumption is a relatively simple reminder that we are connected.¹⁴⁸

For a more complicated, harder to regulate, example of risk from cumulative exposure to certain classes of chemicals, consider the growing concerns about exposure to endocrine disrupting chemicals. These chemicals are used in numerous consumer products and released into the environment.¹⁴⁹ As part of its biomonitoring research, the Center for Disease Control reported that its scientists found Bisphenol A (“BPA”) “in the urine of nearly all of the people tested, which indicates widespread exposure to BPA in the U.S. population.”¹⁵⁰ BPA is one of several such chemicals that demonstrates a potential to alter endocrine function and sexual development.¹⁵¹ The ubiquitous nature of these disruptors has caused medical researchers to consider whether the phenomena of early puberty onset in children is the result of cumulative exposure to endocrine disrupting chemicals.¹⁵² The potential consequences of repeated exposure to endocrine disrupting chemicals is a good example of how we are connected in space and time—it suggests that consequences are neither the result of an isolated exposure nor are the impacts instantaneous, and yet the nature of the consequences could alter the reproductive capacity of future generations. The complex, multistressor nature of these risks requires a regulatory approach that examines cumulative exposure as a method for setting priorities and evaluating the effectiveness of regulatory frameworks.¹⁵³

is more likely to have male offspring.)

¹⁴⁷ See Manzetti et al., *supra* note 145, at 713.

¹⁴⁸ Catherine A. O’Neill, *Mercury, Risk & Justice*, 34 ENVTL. L. REP. 11070 (Oct. 2004) (discussing failed regulatory response to mercury emissions and subsequent attempts to deal with the problem on the back end through fish consumption advisories).

¹⁴⁹ See Manzetti et al., *supra* note 145, at 718.

¹⁵⁰ Centers for Disease Control and Prevention, Factsheet: Bisphenol A (Dec. 23, 2016), https://www.cdc.gov/biomonitoring/bisphenola_factsheet.html [<https://perma.cc/6649-4P96>].

¹⁵¹ See Manzetti et al., *supra* note 145, at 718 (“In humans, estrogen analogues have been linked to contributing to earlier sexual maturation in girls and abnormal genital development in boys.”). James A. Rogers et al., *Review: Endocrine Disrupting Chemicals and Immune Responses: A Focus on Bisphenol-A and Its Potential Mechanisms*, 53 MOLECULAR IMMUNOLOGY 421 (2013). See generally Caitlin M. Jandegian et al., *Developmental Exposure to Bisphenol A (BPA) Alters Sexual Differentiation in Painted Turtles (Chrysemys Picta)*, 216 GEN. & COMP. ENDOCRINOLOGY 77 (2015) (demonstrating that BPA exposure disrupts sexual development).

¹⁵² Marisa M. Fisher and Erica A. Eugster, *What Is in Our Environment that Effects Puberty?*, 44 REPROD. TOXICOLOGY 7 (Apr. 2014), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4096833/pdf/nihms598765.pdf> [<https://perma.cc/U39B-D39M>].

¹⁵³ Knudsen, *supra* note 144, at 2331.

3. *Interconnected Water Systems*

Even within singular systems—like water—there can be unintended consequences when too narrow a view is taken on a regulatory issue. For example, though groundwater appropriations are often treated independently from surface water appropriations, groundwater pumping can impact surface water availability.¹⁵⁴ One examination of the perils of groundwater pumping took note that “[f]rom Tucson to Tampa Bay, from California’s Central Valley to Down East Maine, rivers and lakes have disappeared, and fresh water is becoming scarce.”¹⁵⁵ This “overdrafting” of groundwater can result in saltwater intrusion into fresh water supplies in coastal areas; it can also cause land to subside, which damages home and commercial structures.¹⁵⁶ In Pasco County, north of Tampa Bay, the damage caused by land subsidence has resulted in “lawsuits, insurance claims, and considerable ill will.”¹⁵⁷

In Whatcom County, Washington, controversy and litigation erupted when the County’s practice of allowing unpermitted and largely undocumented wells for the use of groundwater began to negatively impact the flow of surface water.¹⁵⁸ The dispute eventually made its way to the Washington Supreme Court where the County was held accountable for protecting the availability of water resources in making permitting decisions.¹⁵⁹ Because the Court took notice of the interconnected nature of the groundwater permitting and the surface water availability, the Court held that the County should have considered impacts of groundwater permitting on surface water resources.¹⁶⁰ The decision turned in part on the County’s particular responsibilities under the State’s Growth Management Act to protect water resources.¹⁶¹

¹⁵⁴ For a stunning graphical depiction of the complex network of rivers and streams in the contiguous United States, see this river basin map: http://www.dailymail.co.uk/science_tech/article-3860062/The-veins-America-Stunning-map-shows-river-basin-US.html#ixzz400tv1TRU [<https://perma.cc/R5YS-QN7G>]. This map is a visual reminder that large regions of our country are hydrologically connected, which of course means actions in one place have consequences in another.

¹⁵⁵ Robert Glennon, *The Perils of Groundwater Pumping*, 19 ISSUES IN SCI. AND TECH. 1, 1 (2002), <http://issues.org/19-1/glennon/> [<https://perma.cc/3MPU-SRR7>].

¹⁵⁶ *Id.* at 3.

¹⁵⁷ *Id.*

¹⁵⁸ *Whatcom Cty. v. Hirst*, 381 P.3d 1, 4 (Wash. 2016).

¹⁵⁹ *Id.* at 8–21.

¹⁶⁰ *Id.* at 18. *See also* *Postema v. Pollution Control Hearings Bd.*, 11 P.3d 726, 734–35 (Wash. 2000) (holding that before authorizing groundwater withdrawals the Department of Ecology “must consider the interrelationship of the groundwater with surface waters, and must determine whether surface water rights would be impaired or affected by groundwater withdrawals.”).

¹⁶¹ *Hirst*, 381 P.3d at 12 (“When read as a whole, the GMA places the burden on counties to protect groundwater resources, and requires counties to assure that water is both factually and legally available before issuing building permits.”).

4. *Introduced Species*

For an example of how the disruption of natural systems can result in economic damage, consider that the introduction and spread of the zebra mussel are estimated to cost the American economy more than \$1 billion dollars annually.¹⁶² These pesky mollusks, which are endemic to the drainage basins of Eastern Europe and Western Asia, were inadvertently introduced to U.S. waters through the discharge of ship ballast water into freshwater bodies by the shipping industry.¹⁶³ Zebra mussels were first recorded in Lake St. Clair in 1988.¹⁶⁴ Since then, they have spread through the Great Lakes and directly impacted the chemical and biological composition of the water they inhabit.¹⁶⁵ They have disrupted food webs and adversely impacted water clarity and quality by changing nitrogen and phosphorous concentrations.¹⁶⁶ They have been linked to the decline in endemic shellfish and pelagic fish, negatively impacted municipal drinking water, and disrupted hydroelectric projects.¹⁶⁷ And in doing so, they serve as a potent reminder of how interconnectivity allows something as seemingly benign as a mollusk to wreak havoc.

Together, these examples provide lessons, often recounted and often forgotten, of the complex and dynamic living systems of which humans are an integral part. To the extent that environmental laws aim to protect these living systems, the interconnectivity is a humbling reminder that pollutants, nor risk, nor proposed land use projects can be viewed in isolation if the goal is a healthy ambient environment.

B. Cumulative Impacts as a Generalizable Concern in Environmental Law

While science describes, it does not prescribe.¹⁶⁸ While science illuminates the interconnectedness nature of human relationships to ecosystems, it does not make morally bound choices like whether certain species are worth saving from extinction, whether Americans should expect clean drinking water to flow from their taps, or whether children and grandchildren should inherit a stable climate system. These choices require understanding the future consequences of present action; they require governing bodies to decide what limits to place on individual choice such

¹⁶² Doug Jensen, *Zebra Mussels Threaten Inland Waters: An Overview*, MINN. SEA GRANT (Mar. 30, 2017), http://www.seagrant.umn.edu/ais/zebramussels_threaten [<https://perma.cc/9VJU-KTP7>] (noting that zebra mussels are estimated to cost the American economy more than \$1 billion dollars annually).

¹⁶³ Charles R. O'Neill, Jr. et al., *The Introduction and Spread of the Zebra Mussel in North America*, PROC. OF FOURTH INT'L. ZEBRA MUSSEL CONF., MADISON, WIS., 433, 433–35 (Mar. 1994).

¹⁶⁴ *Id.* at 433.

¹⁶⁵ David L. Strayer, *Twenty Years of Zebra Mussels: Lessons from the Mollusk that Made Headlines*, 7 FRONT. ECOL. ENV'T 135, 135–36 (Sept. 25, 2008).

¹⁶⁶ *Id.* at 136.

¹⁶⁷ *Id.* at 138.

¹⁶⁸ Eric T. Freyfogle & Julianne L. Newton, Essay, *Putting Science in Its Place*, 16 CONSERVATION BIOLOGY 863, 864–65 (2002).

that the group can thrive in a healthful environment. Those choices, left to lawmakers, involve tradeoffs and are not always easy or obvious. Nonetheless, the basic goal is simple: to restrain what might be individually benign actions in order to prevent them from collectively destructive consequences.

Indeed, from Garrett Hardin's Tragedy of the Commons to Aldo Leopold's call for a land ethic, the consequences of collective actions have long driven the need for a regulatory and cultural response to environmental problems. Not surprisingly, while many of the major environmental laws regulate individual pollutants, individual discharges, or individual species, the ultimate goal is a healthy ambient environment. That is, the goal is to create a healthful environment by addressing cumulative impacts of individual actions. By looking at the pattern of goals and mandates within the major body of federal environmental law, one can begin to appreciate how cumulative impacts lie at the heart of the problems that Congress has set out to solve.

1. Pattern of Goals, Purpose Statements and Research Directives

To begin, consider that the core goals, purpose statements, or research directives of the major federal environmental statutes speak to the consequences of collective action through time and space. The Clean Water Act, for instance, begins by announcing its objective to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."¹⁶⁹ Congress then declares the national goal of making waters fishable and swimmable by 1983.¹⁷⁰ Whatever the mechanisms used by the Act to control individual sources of pollution, whatever the historical debate over the effectiveness of water quality standards or effluent limitations,¹⁷¹ protecting ambient water quality is the undisputable aim of the Clean Water Act.¹⁷²

The Clean Air Act starts off a bit more broadly, calling for a regulatory program that protects the public health and welfare.¹⁷³ Through the details of the Act,

¹⁶⁹ 33 U.S.C. § 1251(a) (2017).

¹⁷⁰ *Id.* § 1251(a)(2).

¹⁷¹ WILLIAM H. RODGERS, JR. & ELIZABETH BURLESON, ENVIRONMENTAL LAW § 4:1 (2d ed. 2016).

¹⁷² See Robert W. Adler, *Integrated Approaches to Water Pollution: Lessons from the Clean Air Act*, 23 HARV. ENVTL. L. REV. 203, 251 (1999) [hereinafter Adler, *Integrated Approaches*] (noting that the water quality standards of the Clean Water Act, like the national ambient air quality standards of the Clean Air Act, are "designed to establish goals for ambient environmental quality and to address cumulative pollution from multiple and diverse sources."). See also Robert W. Adler, *The Decline and (Possible) Renewal of Aspiration in the Clean Water Act*, 88 WASH. L. REV. 759, 763 (2013) [hereinafter Adler, *Decline and Renewal*]. ("Congress made clear in the legislative history of the 1972 amendments . . . that 'chemical, physical, and biological integrity' means something approximating natural aquatic ecosystem structure and function.").

¹⁷³ 42 U.S.C. § 7401(b)(1) (2017) (declaring one purposes of the Act "to protect and enhance the quality of the Nation's air resources so as to promote the public health and

however, it becomes clearer that Congress was particularly mindful of how cumulative impacts lie at the heart of public health. For instance, consider that Section 103(d) of the Act directs the EPA to research both short and long term effects of air pollutants on human health.¹⁷⁴ In doing so, the EPA is told that risks from both individual air pollutants and combined exposures are relevant.¹⁷⁵ Section 103(e), which addresses ecosystem research, expresses similar interest in long term ecosystem damage from air pollutants and directs the EPA to develop a research program that quantifies exposure to and effects of “multiple environmental stresses.”¹⁷⁶

Even when Congress adopted the Toxic Substances Control Act (“TSCA”) in 1976¹⁷⁷—the very same statute that would become known as one of the most broken environmental statutes of the 1970s era¹⁷⁸—Congress understood that cumulative impacts lie at the heart of the public health risks from chemicals proliferation.¹⁷⁹ The Conference Report supporting the passage of TSCA expressly acknowledges that “[o]ftentimes an unreasonable risk will be presented because of the interrelationship or cumulative impact of a number of different substances or mixtures. The conferees intend that the Administrator have authority to protect health and the environment in such situations.”¹⁸⁰ Similarly, the House Report cautions that “[b]ecause of the multiple avenues by which humans and the environment are exposed to a substance or mixture and because substances and mixtures do not occur in the environment in isolation, risks may result from complex interactions or because of cumulative effects.”¹⁸¹

Within natural resource statutes, congressional concern for cumulative impacts is often manifested most directly in mandates aimed at balancing resource use between generations. For example, in the National Forest Management Act (“NFMA”),¹⁸² Congress declares that:

welfare and the productive capacity of its population”). Public health and welfare are collective concepts in their own right. *See* Ronald Bayer, *The Continuing Tensions Between Individual Rights and Public Health*, 8 EMBO REPORTS 1099, 1102 (2007) (“Across the spectrum of threats to the public health—from infectious diseases to chronic disorders—are inherent tensions between the good of the collective and the individual.”).

¹⁷⁴ 42 U.S.C. § 7403(d)(1) (2017).

¹⁷⁵ *Id.* § 7403(d)(2).

¹⁷⁶ *Id.* § 7403(e)(3).

¹⁷⁷ 15 U.S.C. §§ 2601–2697 (2016).

¹⁷⁸ For a sampling of the critiques leveled against TSCA, see Tracy Bach, *Better Living Through Chemicals (Regulation): The Chemical Safety Improvement Act of 2013 Through an Environmental Public Health Law Lens*, 15 VT. J. ENVTL. L. 490, 495–506 (2014) (discussing TSCA’s “poor track record”); Noah M. Sachs, *Jumping the Pond: Transnational Law and the Future of Chemical Regulation*, 62 VAND. L. REV. 1817, 1825–31 (2009) (discussing “TSCA’s troubles”).

¹⁷⁹ Knudsen, *supra* note 144, at 2315 & n.8.

¹⁸⁰ H.R. REP. NO. 94-1679, at 61 (1976) (Conf. Rep.).

¹⁸¹ H.R. REP. NO. 94-1341, at 33 (1976).

¹⁸² 16 U.S.C. §§ 1600–1687 (2017).

the Forest Service, by virtue of its statutory authority for management of the National Forest System, . . . has both a responsibility and an opportunity to be a leader in assuring that the Nation maintains a natural resource conservation posture that will meet the requirements of our *people in perpetuity*.¹⁸³

Similarly, NFMA's close cousin the Federal Land Policy Management Act ("FLPMA"), which draws on the notoriously broad concept of multiple use, directs the Bureau of Land Management ("BLM") to utilize resources "in the combination that will *best meet the present and future needs of the American people*."¹⁸⁴ And more specifically, in the development of land use plans, the Secretary must "*weigh long-term benefits to the public against short-term benefits*."¹⁸⁵ The National Parks Service Organic Act and Wilderness Act—though upholding more focused missions of conservation and recreation—have similar visions of preserving beautiful and ecologically important spaces *for future generations*.¹⁸⁶

In carrying out these land use planning missions, natural resource managers must necessarily grapple with the cumulative impacts of their land use decisions over space and time. And in fact, these land managers are separately under the obligation of considering the cumulative impacts of their proposed projects and land use plans under the mandates of the National Environmental Policy Act ("NEPA").¹⁸⁷ Setting NEPA and its crosscutting obligations aside for a moment, the point here is that the prescriptions of the individual organic acts necessarily require land managers to adopt a cumulative impacts lens if they are going to properly address intergenerational aspects of resource management.

Read together, the aspirational statements that pulse throughout pollution control and natural resource statutes start to resemble a more generalizable ethos, one that bears a decidedly public health and intergenerational focus on maintaining or creating a healthy ambient environment. In other words, the core goals and declarations of Congress support the view that environmental law is a collection of efforts aimed toward a common goal of addressing cumulative impacts over time and space. Indeed, unlike cost, cumulative impacts are core to the mission of adopting these statutes in the first place. In other words, cost may be a second order consideration that is relevant to the regulatory choices, but cumulative impacts are first order considerations that drive the regulatory mission itself.

¹⁸³ *Id.* § 1600(6) (emphasis added) (setting forth the responsibilities of the U.S. Forest Service).

¹⁸⁴ 43 U.S.C. § 1702(c) (2017) (emphasis added) (defining the term "multiple use").

¹⁸⁵ *Id.* § 1712(c)(7) (emphasis added) (setting out criteria for developing land use plans).

¹⁸⁶ National Park Service Organic Act, 54 U.S.C. § 100101(a) (2014) (setting out the purpose of national parks for the use of the people in a manner that will "leave them unimpaired for the enjoyment of future generations"); Wilderness Act of 1964, 16 U.S.C. § 1131(a) (2017) (stating that the wilderness areas "shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness . . .").

¹⁸⁷ 42 U.S.C. §§ 4321–4370(h) (2017). *See also* discussion *infra* Section II.B.3.

2. *Patterns of Statutory Mandates and Structures*

While some would argue that broad statutory aspirations are of limited utility and one ought to be careful to read too much into them, the seriousness with which these aspirations ought to be treated is amplified considering that the major environmental laws also contain mandates and programs to ensure that the ambient environment is protected. Professor and leading environmental law scholar Robert Adler has made a similar observation with respect to the Clean Water Act. He argued that the aspirational goals of the Clean Water Act merit particular weight in the implementation of the Act because elsewhere in the Act, Congress matched aspiration goals with specific mandates.¹⁸⁸

Similarly, for cumulative impacts, Congress buttressed aspirational goals and research agendas with implementing mandates. In doing so, Congress demonstrated a commitment to addressing the fundamental problem of cumulative impacts on ambient environmental and public health.¹⁸⁹ In other places, Congress was less explicit, though the necessity of considering cumulative impacts to fulfill the underlying goals of a particular statute is nonetheless apparent.¹⁹⁰

The Clean Water Act, for example, does more than require individual point sources to obtain individual discharge permits. Because the Act's ultimate goal is a nation of rivers and lakes clean enough to swim in, the Act directly addresses ambient water quality through several provisions. First, retaining the foundations of water quality statutes that came before. The Clean Water Act requires states to set ambient water quality standards for every water body within the state.¹⁹¹ Next, in writing individual discharge permits, regulators are supposed to ensure that the terms of the permits will not cause receiving waters to exceed those ambient water quality standards.¹⁹²

¹⁸⁸ Adler, *Decline and Renewal*, *supra* note 172, at 771–72.

¹⁸⁹ *See, e.g.*, 42 U.S.C. §§ 7408–7410 (2017) (explaining that the Clean Air Act sets national ambient air quality standards (NAAQS) for six criteria pollutants and requires states to adopt implementation plans that ensure the aggregate air emissions in that state will not exceed the ambient standards); 33 U.S.C. § 1313(d)(1) (2017) (explaining that the Clean Water Act requires states to develop Total Maximum Daily Loads (TMDLs) for all water bodies that fail to meet ambient water quality standards); 40 C.F.R. § 1508.7 (2017) (explaining that the National Environmental Policy Act requires all federal agencies to consider cumulative impacts of their proposed actions by accounting for the combined impacts of past, present, and future projects on a particular resource).

¹⁹⁰ TSCA and FIFRA—the major federal chemical and pesticide statutes—are good examples. *See generally* Knudsen, *supra* note 144 (discussing the policy implications of chemical proliferation).

¹⁹¹ 33 U.S.C. §§ 1311(b)(1)(C), 1313 (2017); PUD No. 1 of Jefferson Cty. v. Washington Dep't of Ecology, 511 U.S. 700, 704, 114 S. Ct. 1900, 1905 (1994) (“Section 303 of the Act also requires each State, subject to federal approval, to institute comprehensive water quality standards establishing water quality goals for all intrastate waters.”).

¹⁹² *See* 33 U.S.C. § 1311(b)(1)(C) (2017); 40 C.F.R. § 122.44(d) (2017). *See also*

But because best laid intentions are not always enough, and because individual waters can receive pollutant from both permitted point sources (which are required to get a permit) and nonpoint sources (that are not required to get a permit), Congress added yet another mechanism by which to address ambient water quality—the Total Maximum Daily Load, or TMDL program.¹⁹³ Under the program, namely Section 303(d), states are required to create a list of waters that fail to meet water quality standards.¹⁹⁴ The state must then develop what is called a TMDL for these impaired waters by determining how much of a given pollutant can enter the receiving water and still meet the water quality standard.¹⁹⁵ The TMDL process develops an accounting of all the sources—point and nonpoint—that contribute to the water’s pollutant load.¹⁹⁶ Finally, once the regulators have figured how much pollutant a given body of water *can* receive and how much it *actually* receives, the regulators allocate a portion of the total load to the identified sources, with a margin of safety.¹⁹⁷

These structural designs have played out differently in practice—namely, cumulative impacts continue to confound the quest for clean waters.¹⁹⁸ Still, there is

Arkansas v. Oklahoma, 503 U.S. 91, 101 (1992) (Water quality standards “supplement effluent limitations ‘so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.’” (quoting EPA v. California ex rel. State Water Resources Control Bd., 426 U.S. 200, 205, n. 12 (1976))).

¹⁹³ WILLIAM H. RODGERS, JR. & ELIZABETH BURLESON, ENVIRONMENTAL LAW § 4:18 (Dec. 2017 Update) (“In one respect, the pollution load assignment provisions of Section 303(d) are a monument to the ambitions of rational decisionmaking. . . . In another respect Section 303(d) represents an acutely political judgment keeping the banner of water quality in evidence despite the temporary ascendancy of technology-based controls. It was included in the Act at the insistence of the House conferees and reflects the historical water quality standards assumption that assimilation of wastes is a fit and proper function of a watercourse. In a sense, Section 303(d) represents contingent planning by the Congress for the day when the no-discharge objective is abandoned in favor of basin level allocations of assimilative capacity.”).

¹⁹⁴ 33 U.S.C. § 1313(d)(1)(A) (2017). For an in depth discussion of TMDLs, see generally OLIVER A. HOUCK, THE CLEAN WATER ACT TMDL PROGRAM: LAW, POLICY, AND IMPLEMENTATION (2d. ed. 2002).

¹⁹⁵ 33 U.S.C. § 1313(d)(1)(C) (2017).

¹⁹⁶ For a brief primer on TMDL development, see *Program Overview: Total Maximum Daily Loads (TDMLS)*, EPA (Mar. 2, 2017), <https://www.epa.gov/tmdl/program-overview-total-maximum-daily-loads-tmdl> [<https://perma.cc/P784-2XHE>]. Cf. Pronsolino v. Nastri, 291 F.3d 1123 (9th Cir. 2002) (upholding EPA’s authority to establish a TMDL even where a river is impaired only by nonpoint sources of pollution).

¹⁹⁷ 33 U.S.C. § 1313(d)(1)(C) (2017); see also *Program Overview: Total Maximum Daily Loads (TDMLS)*, EPA (Mar. 2, 2017), <https://www.epa.gov/tmdl/program-overview-total-maximum-daily-loads-tmdl> [<https://perma.cc/P784-2XHE>].

¹⁹⁸ Adler, *Integrated Approaches*, *supra* note 172, at 203 (“Significant water pollution problems remain throughout the United States a quarter-century after enactment of the Nation’s major water pollution-fighting statute, the Clean Water Act These problems stem in large part from inadequate programs to address cumulative harm to aquatic ecosystems from disparate and diffuse pollution sources.”).

no doubt that the Clean Water Act's ambient water quality standards and TMDL program were designed to address cumulative impacts in theory. Because ambient water quality is undoubtedly relevant to the success story of the Clean Water Act, cumulative impacts must likewise be relevant to the permitting decisions and other policy choices made under the Act.

Like the Clean Water Act, the Clean Air Act is designed to regulate individual sources of pollution in service of protecting the ambient air quality. To that end, at the structural heart of the Clean Air Act lies the National Ambient Air Quality Standards ("NAAQS").¹⁹⁹ The basic idea is this: for the most common pollutants, the federal government will set ambient air quality standards adequate to protect public health and then states will decide how to control local pollution sources and employ control strategies to meet those standards.²⁰⁰ The NAAQS (and any given region's ability to meet those standards) impacts the stringency of pollution control technology that will be imposed on existing and new major stationary sources.²⁰¹ In this way, controlling individual sources of air emissions is in service of the overarching goal of meeting ambient air quality standards and protecting public health.

Other provisions similarly underscore Congress's mindfulness of the interconnectivity of individual actions. The Clean Air Act's good neighbor provision, for instance, requires states to prevent emissions that would "contribute significantly to nonattainment in, or interfere with maintenance by, any other state with respect to any such national primary or secondary ambient air quality standard."²⁰² At least for individual criteria pollutants, the Clean Air Act requires states to examine a more complex set of combined exposures in order to avoid downwind disturbances. This same rationale—that emissions in one area can adversely impact downwind localities and should therefore be evaluated as part of the regulatory decisionmaking process—would also hold true outside of the NAAQS context and counsel for the consideration of cumulative impacts in furthering the public health mission of the Act.

While cumulative impacts are made relevant to the Clean Air Act and Clean Water Act through their desire to protect the ambient environment and public health, cumulative impacts are made relevant to toxic control statutes through their desire to protect human health and the environment from "unreasonable risk."²⁰³ To that

¹⁹⁹ 42 U.S.C. § 7409 (2017) (requiring the EPA to protect public health through ambient air quality standards); *see also* DAVID R. WOOLEY & ELIZABETH M. MORSS, *CLEAN AIR ACT HANDBOOK* § 1:2 (25th ed. 2015) ("Although somewhat eclipsed by newer pollutant or source-specific requirements such as the Title IV acid rain program, the NAAQS remain the cornerstone of the CAA.").

²⁰⁰ WOOLEY & MORSS, *supra* note 199, at §§ 1:29, 1:30.

²⁰¹ *Id.* at § 4:6.

²⁰² 42 U.S.C. § 7410(a)(2)(D)(i)(I) (2017) ("good neighbor" provision); *see also* Daniel A. Farber, *Unpacking EME Homer: Cost, Proportionality, and Emissions Reductions*, 4 *MICH. J. ENVTL. & ADMIN. L.* 213, 215 (2015) (discussing the complexities of deciding how to allocate pollution control responsibilities among states given the mobility of air).

²⁰³ *See* Toxic Substances Control Act, 15 U.S.C. § 2604(f) (2016); Chemical Safety

end, when Congress adopted TSCA in 1976, it gave the EPA authority to regulate chemical substances and mixtures that posed an “unreasonable risk” to public health and environment.²⁰⁴ In defining “environment,” Congress expressly made interrelationships between resources relevant to the risk calculus.²⁰⁵ The statutory text, the rich legislative history recounting congressional concerns about cumulative exposure,²⁰⁶ and the extensive risk science literature identifying cumulative exposures as key to understanding public health risks posed by chemicals proliferation together suggest that cumulative exposures are centrally relevant to the risk analysis.²⁰⁷

In 2016, in recognition of the many failings of TSCA to actually protect public health from chemicals regulation, Congress modernized TSCA by adopting the Frank R. Lautenberg Chemical Safety for the 21st Century Cures Act (“new Act” or “Chemical Safety Act”).²⁰⁸ In doing so, Congress shifted the burden of proving chemical safety from the EPA to the chemical industry and adopted other structural changes meant to strengthen the uniformity and public health protections of the Act.²⁰⁹ Congress retained the “unreasonable risk” threshold to regulation and retained the definition of environment to include interrelationships.²¹⁰ The new Act also gives the EPA authority to create testing protocols and methodologies to develop information regarding “cumulative or synergistic effects, and any other effect which may present an unreasonable risk of injury to health or the environment.”²¹¹ From a textual standpoint, then, cumulative impacts remain

Act, 15 U.S.C. § 2605(a) (2016); Federal Insecticide, Fungicide, and Rodenticide Act 7 U.S.C. § 136(z)(bb) (2017).

²⁰⁴ Toxic Substances Control Act, 15 U.S.C. § 2604(f) (2012).

²⁰⁵ 15 U.S.C. § 2602(6) (2016) (defining environment).

²⁰⁶ See Knudsen, *supra* note 144 and accompanying text.

²⁰⁷ See Knudsen, *supra* note 144, at 2322–31 (discussing the risk science literature).

²⁰⁸ 15 U.S.C. §§ 2601–2697 (2016); see also Knudsen, *supra* note 144, at 2386–89 (discussing the room for regulating cumulative risk under the recent TSCA amendments).

²⁰⁹ See 15 U.S.C. § 2604(g) (2016) (“If the Administrator finds in accordance with subsection (a)(3)(C) that a chemical substance or significant new use is not likely to present an unreasonable risk of injury to health or the environment, then . . . the submitter of the notice may commence manufacture of the chemical substance or manufacture or processing for the significant new use.”); see also 15 U.S.C. § 2601(b)(1) (2016) (stating it is the policy of the United States that “adequate information should be developed with respect to the effect of chemical substances and mixtures on health and the environment and that the development of such information should be the responsibility of those who manufacture and those who process such chemical substances and mixtures.”).

²¹⁰ 15 U.S.C. § 2605(a) (2016) (requiring the EPA to regulate any chemical that “presents an unreasonable risk of injury to health or the environment”); 15 U.S.C. § 2602(6) (2016) (defining “environment” to mean “water, air, and land and the interrelationship which exists among and between water, air, and land and all living things.”).

²¹¹ 15 U.S.C. § 2603(b)(2)(A) (2016) (“The health and environmental effects for which protocols and methodologies for the development of information may be prescribed include carcinogenesis, mutagenesis, teratogenesis, behavioral disorders, cumulative or synergistic effects, and any other effect which may present an unreasonable risk of injury to health or

relevant to the risk calculus under the new Act, perhaps even more expressly so. And from the standpoint of scientific understanding and pragmatism, the relevance cumulative risk to public health protection is also unchanged.²¹²

Similar to the Chemical Safety Act, the Federal Insecticide Fungicide and Rodenticide Act (“FIFRA”) authorizes the EPA to limit the distribution, sale or use of a pesticide “to prevent unreasonable adverse effects on the environment.”²¹³ And like the Chemical Safety Act, FIFRA broadly defines “environment” to mean “water, air, land, and all plants and man and other animals living therein, and the interrelationships which exist among these.”²¹⁴ Nothing in the language of FIFRA suggests that cumulative exposures fall outside the safety thresholds. In fact, Congress amended FIFRA in 1996 to require the EPA to protect public health based on combined impacts from pesticides in some circumstances.²¹⁵ In particular, FIFRA was amended to take aggregate exposures to pesticides into account when setting pesticide residue limits on food.²¹⁶ These amendments, also known as the Food Quality Protection Act, responded to warnings from the National Academy of Sciences on the importance of assessing collective impacts from pesticides.²¹⁷ While there are still substantial gaps to be filled in this area,²¹⁸ the Food Quality Protection Act is an example of how, even in areas where industry captured the regulatory frameworks early on, the science is compelling a shift in statutory mandates to more directly address the cumulative risk presented by environmental issues.²¹⁹

In natural resource statutes, which are more focused on the land use planning and conservation of particular areas for future generations, evaluating cumulative impacts is an essential feature to the balancing short term desires with long term obligations. For example, in determining the appropriate level of grazing on public lands, BLM managers need to consider how drought and other changing land conditions from climate change will impact the ability of the range to support cattle.²²⁰ Public land managers are similarly obliged to consider cumulative impacts

the environment.”).

²¹² See generally Knudsen, *supra* note 144 (discussing chemical proliferation).

²¹³ 7 U.S.C. § 136a(a) (2017).

²¹⁴ 7 U.S.C. § 136(j) (1996).

²¹⁵ Food Quality Protection Act of 1996, Pub. L. No. 104–170, 110 Stat. 1489 (codified as amended at 21 U.S.C. § 346(a) (2017)). For a discussion of the history and limitations of these amendments, see Knudsen, *supra* note 144, at 2375–82.

²¹⁶ 21 U.S.C. § 346(a) (2017).

²¹⁷ See Knudsen, *supra* note 144, at 2378.

²¹⁸ For a critique of the implementations gaps that exist under FIFRA despite the FQPA, see Thomas O. McGarity, *Politics by Other Means: Law, Science, and Policy in EPA’s Implementation of the Food Quality Protection Act*, 53 ADMIN. L. REV. 103, 109–10 (2001); see also Knudsen, *supra* note 144, at 2380–82.

²¹⁹ See Knudsen, *supra* note 144, at 2375–82.

²²⁰ Robert L. Beschta et al., *Adapting to Climate Change on Western Public Lands: Addressing the Ecological Effects of Domestic, Wild, and Feral Ungulates*, 51 ENVTL. MGMT. 474, 475 (2012) (“Although federal land managers have recently begun considering how to adapt to and mitigate potential climate-related impacts, they have not addressed the combined effects of climate change and ungulates (hooved mammals) on ecosystems.”). *Cf.*

when considering whether to move ahead with various extractive or energy development projects.²²¹ When no such analysis is forthcoming, courts have held agency decisions arbitrary and capricious.²²²

In some ways, it might seem overly simplistic to suggest that environmental laws can be distilled to a common core of defining principles. After all, these statutes are complex and employ a wide range of tools and mandates to serve their designs. But the argument here is not that these laws have a singular purpose. In fact, many do not. Some, like FLPMA, are decidedly broad in their multiple use goals²²³ and others, like FIFRA, have been roundly criticized as bearing too heavy of an industry focus.²²⁴ The Chemical Safety Act, despite being updated to more adequately address public health, continues to wear economic considerations on its sleeve.²²⁵

Tony Svejcar et al., *Western Land Managers will Need all Available Tools for Adapting to Climate Change, Including Grazing: A Critique of Beschta et al.*, 53 ENVTL. MGMT. 1035, 1036 (2014) (“Broad scale reduction of domestic and wild herbivores to help native plant communities cope with climate change will be unnecessary because over the past 20–50 years land managers have actively sought to bring populations of native and domestic herbivores in balance with the potential of vegetation and soils.”).

²²¹ See, e.g., *S. Utah Wilderness All. v. Norton*, 326 F. Supp. 2d 102, 119–20 (D.D.C. 2004) (concluding that the BLM properly elected to conduct an EA instead of an EIS because “[t]he determination of whether BLM should have prepared an EIS turns largely on whether the EA was adequately conducted and properly took cumulative impacts into account” and the BLM had dedicated an entire chapter in the EA to cumulative impacts analysis); *Native Vill. of Point Hope v. Salazar*, 730 F. Supp. 2d 1009, 1012 (D. Alaska 2010) (deferring to the agency’s informed discretion in approving an oil and gas lease when agency devoted 76 pages of its EIS to a cumulative impacts assessment). See also Arnold W. Reitze, Jr., *The Role of NPEA in Fossil Fuel Resource Development and Use in the Western United States*, 39 B.C. ENVTL. AFF. L. REV. 283, 311–63 (2012) (assembling cases involving cumulative impacts challenges to energy development projects on public lands).

²²² See *Sierra Club v. Mainella*, 459 F. Supp. 2d 76, 107–08 (D.D.C. 2006) (holding the National Park Service’s decision to allow oil and gas drilling operations on NPS lands was arbitrary and capricious because the Service had failed to consider the cumulative impacts of the drilling operations); *Wyo. Outdoor Council v. U.S. Army Corps of Eng’rs*, 351 F. Supp. 2d 1232, 1237 (D. Wyo. 2005) (vacating permit allowing the release of coalbed methane water into above ground reservoirs because the Army Corps had failed to consider cumulative impacts); *Te-Moak Tribe v. U.S. Dep’t of the Interior*, 608 F.3d 592, 601 (9th Cir. 2010) (concluding that the BLM’s cumulative impact analysis of proposed gold mining operations on public lands was insufficient).

²²³ 43 U.S.C. § 1701(a)(7) (2017) (declaring that “management be on the basis of multiple use”); 43 U.S.C. § 1702(c) (2017) (defining the term “multiple use”).

²²⁴ See Pamela A. Finegan, *FIFRA Lite: A Regulatory Solution or Part of the Pesticide Problem?*, 6 PACE ENVTL. L. REV. 615 (1989).

²²⁵ 15 U.S.C. § 2601(b)(3) (2016) (declaring congressional policy that the “authority over chemical substances and mixtures should be exercised in such a manner as not to impede unduly or create unnecessary economic barriers to technological innovation while fulfilling the *primary* purpose of this chapter to assure that such innovation and commerce in such chemical substances and mixtures do not present an unreasonable risk of injury to health or the environment.”) (emphasis added).

Indeed, for many of these statutes, at least portions of their implementation are dependent on cost considerations or bounded by technological feasibility.²²⁶

Again, the suggestion here is decidedly not that environmental laws are simple or singular in their aims. Quite the opposite is true. At the same time, however, threading throughout the complexity is a deceptively simple and driving purpose: the statutes that make up the body of environmental law are fundamentally meant to protect human and ecological health from the destructive consequences of collective action. To evaluate whether regulatory decisions in furtherance of these statutes has merit, therefore, one would quite naturally expect some consideration of how the regulatory decision serves the end goals. That is, one would expect some consideration of cumulative impacts and whether the regulatory decision decreases or increases the overall cumulative burden that the statute is ultimately designed to reduce.

3. *NEPA as a Crosscutting Directive*

Perhaps nowhere is the generalizable relevance of cumulative impacts to environmental law more apparent than in NEPA.²²⁷ That crosscutting statute requires *all* federal agencies to consider the environmental impacts of their proposed actions.²²⁸ In particular, NEPA's implementing regulations require all federal agencies to consider cumulative impacts of proposed actions.²²⁹

By way of background, NEPA reflects a congressional commitment to injecting an environmental consciousness into a large range of government decisions. Indeed, though the statute operates procedurally, the driving congressional goals were certainly substantive.²³⁰ In the oft forgotten Section 101 of NEPA, Congress declares that "it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national

²²⁶ See David M. Driesen, *Distributing the Costs of Environmental, Health, and Safety Protection: The Feasibility Principle, Cost-Benefit Analysis, and Regulatory Reform*, 32 B.C. ENVTL. AFF. L. REV. 1, 1 (2005) (discussing the differences between the feasibility principle incorporated in environmental laws and the values embodied in cost benefit analysis).

²²⁷ 42 U.S.C. §§ 4321–4370h (2017).

²²⁸ 42 U.S.C. § 4332(C)(i) (2017).

²²⁹ 40 C.F.R. § 1508.25(c)(3) (2017) (requiring consideration of cumulative impacts); 40 C.F.R. § 1508.7 (2017) (defining the term "cumulative impact").

²³⁰ The Supreme Court in *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351 (1989), famously stated that "NEPA merely prohibits uninformed—rather than unwise—agency action." Still, given the plain and striking textual commitments to substantive goals of reducing environmental degradation, there continues to be scholarly discourse on the substantive reach of NEPA. See, e.g., Nicholas C. Yost, *NEPA's Promise—Partially Fulfilled*, 20 ENVTL. L. 533 (1990) (arguing that the Supreme Court got it wrong); Philip Weinberg, *It's Time to Put NEPA Back on Course*, 3 N.Y.U. ENVTL. L.J. 99 (1994) (discussing NEPA's explicit substantive mandate); Jamison E. Colburn, *The Risk in Discretion: Substantive NEPA's Significance*, 41 COLUM. J. ENVTL. L. 1, 3 nn.7–8 (2016) (assembling the literature).

policy . . . to fulfill the responsibilities of each generation as trustee of the environment for succeeding generations” and to “attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.”²³¹ To attain the lofty goal of “encourag[ing] productive and enjoyable harmony between man and his environment,” Congress established the Council on Environmental Quality (“CEQ”) to facilitate the implementation of NEPA.²³²

Relevant to the consideration of cumulative impacts as part the pattern and practice of agencies, the CEQ’s implementing of regulations has required agencies to consider the direct, indirect, and cumulative impacts of their proposed actions since 1978.²³³ Cumulative impacts are defined by the regulations as

the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.²³⁴

While the cumulative impacts requirement does not flow expressly from the language of the statute itself, Congress did specifically charge agencies with considering “the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity.”²³⁵ Elsewhere, the congressional declarations of policy similarly reference intergenerational stewardship responsibilities.

By openly acknowledging the importance of understanding impacts over longer time horizons, and through the broad declarations of concern for “the profound impact of man’s activity on the interrelations of all components of the natural environment,” the text of NEPA implicitly requires agencies to adopt a cumulative impacts lens.²³⁶ In fact, the CEQ regulations codified federal court decisions that drew from the stated mandates of NEPA and similarly concluded that cumulative impacts were central to fulfilling NEPA’s mission.²³⁷ Professor Courtney Schultz,

²³¹ 42 U.S.C. § 4331(b) (2017).

²³² 42 U.S.C. § 4321 (2017).

²³³ See Courtney A. Schultz, *History of the Cumulative Effects Analysis Requirement Under NEPA and Its Interpretation in U.S. Forest Service Case Law*, 27 J. ENVTL. L. & LITIG. 125 (2012).

²³⁴ 40 C.F.R. § 1508.7 (2017).

²³⁵ 42 U.S.C. § 4332(C)(iv) (2017).

²³⁶ 42 U.S.C. § 4331(a) (2017).

²³⁷ See, e.g., *Nat. Res. Def. Council, Inc. v. Callaway*, 524 F.2d 79 (2d Cir. 1975); *Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976) (“[W]hen several proposals for coal-related actions that will have cumulative or synergistic environmental impact upon a region are pending concurrently before an agency, their environmental consequences must be considered together.”).

in her deep exploration of cumulative impacts assessments under NEPA, has likewise observed that “the cumulative effects requirement represents some of the core goals of NEPA: to consider long-term environmental effects, to look beyond incremental decision-making, and to consider the effects of the actions of multiple actors.”²³⁸

Though cumulative impacts is a long established requirement of NEPA, several studies in the 1990s showed that agencies frequently ignored or gave minimal attention to cumulative impacts analysis.²³⁹ In 1997, to encourage more robust cumulative effects analysis under NEPA, the CEQ published a handbook on cumulative impacts analysis. Federal agencies refer to this handbook in preparing cumulative impacts analyses.²⁴⁰ In the handbook, the CEQ reemphasizes the importance of assessing cumulative impacts in regulatory decisions:

Evidence is increasing that the most devastating environmental effects may result not from the direct effects of particular actions, but from the combination of individually minor effects of multiple actions over time The fact that the human environment continues to change in unintended and unwanted ways in spite of improved federal decision-making . . . is largely attributable to this incremental (cumulative) impact.²⁴¹

Lest one were to question the importance of the CEQ’s statements in this regard, consider that Congress created the CEQ to implement NEPA and gave the CEQ a seat in the White House.²⁴² This structural design not only validates the authority of the CEQ but also underscores Congress’s commitment to creating an ethos of environmental review among agencies and regulatory decisions. In fact, the creation of CEQ alongside NEPA substantially strengthens the comparison of the relevance of cumulative impacts to the relevance of cost in environmental regulation. To that end, CEQ is analogous to OIRA. Both ensure a consistent set of considerations permeate agency decisions.

Just as the Court in *Michigan* took note of the established agency practice of considering cost in regulatory decisionmaking, NEPA shows that cumulative impacts have long been accepted as relevant to agency decisionmaking. In fact, cumulative impacts—in addition to being pragmatically central to the mission of the

²³⁸ Schultz, *supra* note 233, at 133.

²³⁹ *Id.* at 134 n.46 (assembling the literature and discussing the failure of agencies to fully engage cumulative impacts analysis).

²⁴⁰ *Id.* at 135.

²⁴¹ *Id.* at 135 (citation omitted).

²⁴² *Id.* at 130 (“Lynton Caldwell, one of the foremost scholars on NPEA and a principal architect of the Act itself, explains that CEQ was located in the Executive Office of the President in order to assist the president in fulfilling his managerial duties vis-à-vis the federal agencies.”) (citing LYNTON K. CALDWELL, *THE NAT. ENVTL. POL’Y ACT: AN AGENDA FOR THE FUTURE* 39 (1998)).

individual environmental statutes—are also independently endorsed by Congress as a means of fulfilling the goals of NEPA.

* * *

Whether through major pollution control statutes like the Clean Air Act and Clean Water Act, in natural resource statutes like the National Forest Management Act, through crosscutting statutes like NEPA, or in ad hoc amendments like the Food Quality Protection Act, there is an undeniable pattern within environmental and natural resource laws to consider the collective consequences of incremental, individual actions. This pattern is not surprising given the scientific consensus that interconnectivity is ubiquitous and inherent in the environment.

Even where Congress is silent as to the relevancy of cumulative impacts, logic would dictate that interconnectivity is likely to lie at the heart of the problems law seeks to resolve. And logic would further dictate that considering cumulative impacts is central to evaluating the effectiveness of environmental regulatory decisions. If in some cases this seems too loose a statutory connection, recall that *Michigan v. EPA* identified cost as centrally relevant factor of regulatory decisionmaking based largely on pragmatism, patterns of agency practice, and some consistency with congressional aims within other provisions of the Clean Air Act. Just as the Supreme Court recognized in *Michigan v. EPA* with respect to cost, there is a systemic concern for cumulative impacts that supports elevating it to the stature of being a centrally relevant factor in the judicial review framework. If that is the case, we might begin to appreciate that assessing cumulative risk is not only permissible under the regulatory frameworks but an indispensable part of rational decisionmaking.

PART III: WHAT GOOD MIGHT IT DO

Even if one accepts the argument that addressing cumulative impacts is centrally relevant to environmental law, one might still ask why recognizing cumulative impacts in this way is necessary if the statutory goals and mandates supporting the consideration of cumulative impacts are so ubiquitous. More specifically, one might wonder why, in the face of NEPA's crosscutting mandates, it would be productive to tie cumulative impacts directly to the legal frameworks governing judicial review. There are at least three reasons why recognizing cumulative impacts as a centrally relevant factor would be a step forward in environmental decisionmaking.

First, the judicial review framework supplied by the APA provides the broadest, most systematic point of entry into the regulatory decisionmaking process. Tying the consideration of cumulative impacts directly to arbitrary and capricious review ensures that agencies engage in rational decisionmaking even when NEPA does not

apply. To be sure, NEPA, though broad, contains certain carve outs. It does not, for example, apply to the issuance of permits under the Clean Air Act.²⁴³

Second, NEPA is only procedural in nature. NEPA simply requires agencies to consider cumulative impacts and does not constrain the agency's substantive decision.²⁴⁴ By tying cumulative impacts to the arbitrary and capricious framework, agencies would be obligated to justify their decisions in light of cumulative impacts. While arbitrariness review is still quite deferential, it allows courts to take a hard look at the substantive reasoning of the underlying decision if so inclined.²⁴⁵ In that way, the arbitrary and capricious review is a valuable check on ensuring expert agencies do not stray too far beyond congressional commands or common sense. Just as considering cost of regulations reflects generalized judgments about the need to optimize economic efficiency of regulation, considering cumulative impacts allows regulators to measure the success of their efforts against the core mission of environmental law to provide a healthy ambient environment.

Third, perhaps more importantly, recognizing cumulative impacts as a "centrally relevant factor" sharpens the focus of regulatory decisions. To that end, while many of the environmental laws contain goals or implementing mandates aimed at addressing cumulative impacts, issues of ambient pollution are difficult and, therefore, not surprisingly many statutes have fallen short of their lofty goals in implementation.²⁴⁶ There is work to do and refocusing on the core missions of environmental and natural resources law might prove useful. Three brief examples help illustrate the point.

A. Air: Using a Cumulative Impacts Lens to Evaluate Decisions

The NAAQS program, while heralded as a success in terms of the emissions reductions it has achieved, is limited. It regulates only six criteria pollutants—carbon

²⁴³ See 15 U.S.C. § 793(c)(1) (2017) ("No action taken under the Clean Air Act shall be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969.").

²⁴⁴ See 42 U.S.C. §§ 4321–4370h (2017).

²⁴⁵ See, e.g., *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983).

²⁴⁶ See Adler, *Integrated Approaches*, *supra* note 172; RODGERS & BURLESON, *supra* note 193, at § 3:7 ("In another sense, the NAAQSs are not in perpetual motion but rather are strangely stuck, as if the ongoing debate is caught within some invisible but powerful constraints. No new standards are anticipated, and this is not so much a measure of satisfaction with the status quo but of dread in confronting the massive social mobilization associated with implementation."). Despite critiques regarding individual programs, however, seasoned scholars still applaud the success and necessity of federal environmental protection efforts and major statutes like the Clean Air Act. See William L. Andreen, *Of Fables and Federalism: A Re-Examination of the Historical Rationale for Federal Environmental Regulation*, 42 ENVTL. L. 627 (2012); Craig N. Oren, *Is the Clean Air Act at a Crossroads?*, 40 ENVTL. L. 1231, 1235 (2010) ("[T]he [Clean Air] Act has been quite successful in reducing air pollution."); Ann Carlson, *An Ode to the Clean Air Act*, 30 J. LAND USE & ENVTL. L. 119, 123 (2014).

monoxide, particulate matter, SO_x, NO_x, lead, and ozone.²⁴⁷ But there is much to do, particularly in the area of toxic air emissions and greenhouse gas emissions.²⁴⁸ Regulating in these areas, as illustrated by *Michigan v. EPA* and the challenges to the EPA's Clean Power Plan currently pending before the D.C. Circuit, is fraught with controversy.²⁴⁹

One of the common areas of criticism that the EPA faces as it tries to defend these rules, and one area that might benefit from a cumulative impacts lens, is the EPA's reliance on co-benefits in justifying the cost of Clean Air Act regulations.²⁵⁰ Co-benefits are incidental reductions in emissions as a byproduct of the main regulatory goal. For example, in reducing mercury emissions from power plants, the control technologies would also reduce particulate matter emissions. In *Michigan v. EPA*, New York University's Institute for Policy Integrity submitted an amicus brief noting that the "EPA—under presidents of both parties and across four decades—has consistently taken indirect benefits into account when evaluating Clean Air Act regulations."²⁵¹ Not surprisingly, that practice has been criticized by industry as a means of overinflating the benefits of regulation.²⁵²

If one accepts, however, that reducing cumulative impacts is centrally relevant to the mission of environmental regulation, the consideration of co-benefits in the cost benefit calculus might more easily be accepted as a legitimate and even desirable practice. To that end, by recalling that environmental problems are not easily conserved in time, space, or between individual pollutants, we might more readily accept or even insist upon a cost benefit analysis that reflects such complexity.

In a more straightforward application of a cumulative impacts lens to air regulation, one that steers clear of the co-benefits debate, is the simple requirement

²⁴⁷ *Criteria Air Pollutants*, EPA (Aug. 28, 2017), <https://www.epa.gov/criteria-air-pollutants> [<https://perma.cc/ZW64-5AHC>].

²⁴⁸ RODGERS & BURLESON, *supra* note 193, at § 3:20 ("The hazardous air pollutant provisions of Section 1121 stand out as one of the major disappointments of the Clean Air Act, according to several interested observers.") (citing Victor Flatt, *Gasping for Breath: The Administrative Flaws of Federal Hazardous Air Pollution Regulation and What We Can Learn from the States*, 34 *ECOLOGY L.Q.* 107, 110–11 (2007)).

²⁴⁹ Petition for Review, *West Virginia v. EPA*, No. 15-1363 (D.C. Cir. Oct. 23, 2015).

²⁵⁰ For a brief background on the co-benefits debate that lurked in the background of the *Michigan v. EPA* decision and that underlies the Clean Power Plan litigation, see Amanda Reilly, *Battle over EPA 'co-benefits' rages after mercury ruling*, *E&E NEWS* (July 1, 2015), <https://www.eenews.net/stories/1060021172> [<https://perma.cc/B4NN-YSRM>].

²⁵¹ Brief for the Institute of Policy Integrity at New York University School of Law as Amicus Curiae in Support of Respondents at 8, *Michigan v. EPA*, 135 S. Ct. 2699 (2015) (Nos. 14-46, 14-47, 14-49); see also Cass R. Sunstein, *The Real World of Cost-Benefit Analysis: Thirty-Six Questions (and Almost as Many Answers)*, 114 *COLUM. L. REV.* 167, 190 (2014) ("Cobenefits are unquestionably part of that full accounting, and must be counted alongside (and equivalently to) other benefits.").

²⁵² For an example of criticisms levied against the use of co-benefits published by the Federalist Society, see C. Boyden Gray, *EPA's Use of Co-Benefits*, 16 *ENGAGE* 31, 31–33 (2015).

that regulators consider the combined impacts of issuing multiple air permits in a given industrial area.²⁵³ For example, the Minnesota Legislature passed a law in 2008 that required the Minnesota Pollution Control Agency to analyze and consider “cumulative levels and effects of past and current environmental pollution,” before a permit may be issued for a facility located in a specific area of South Minneapolis.²⁵⁴ The legislation came in reaction to a proposed electric generating biomass facility in a community already experiencing “disproportionate exposure to environmental stressors including air pollutants.”²⁵⁵

In response to the legislation, the Minnesota Pollution Control Agency developed a framework for assessing cumulative risks—the Cumulative Levels & Effects Analysis—that drew on many tools and modeling methods already available to the agency.²⁵⁶ Ultimately, the permit applicant, with MPCA’s review and approval, is responsible for completing five steps for a cumulative levels and effects analysis for air permits. The framework was first applied to a permit application in 2010 for “a facility that includes a spray coating booth, natural gas combustion heating, maintenance activities, and an emergency generator.”²⁵⁷ Notably, the facility changed the design after the draft permit was issued to incorporate geothermal heating in order to reduce “short-term emissions of respiratory irritants.”²⁵⁸ It is difficult to ascribe the change to the cumulative impacts framework but the change is certainly consistent with the additional attention to the combined health impacts on the community.

Minnesota serves as an example of how cumulative impacts can be integrated into the air permitting process, but also as an example of why calling out cumulative impacts as centrally relevant is valuable beyond the existing environmental review statutes like NEPA. To that end, without the 2008 legislation, Minnesota’s environmental review statute already required cumulative impacts analysis²⁵⁹ and the Minnesota Supreme Court had already recognized the need for cumulative risk

²⁵³ For an in-depth treatment of why the EPA should consider cumulative impacts in air regulation, see Deborah Behles, *Examining the Air We Breathe: EPA Should Evaluate Cumulative Impacts When It Promulgates National Ambient Air Quality Standards*, 28 PACE ENVTL. L. REV. 200, 215 (2010); see also Sarah Alves & Joan Tilghman, *EPA Authority to Consider Cumulative Effects and Cumulative Risk Assessments in Decision Making Under the Clean Air Act*, 28 J. ENVTL. L. & LITIG. 151, 152–54 (2013) (explaining the benefits of engaging in cumulative risk-based decision making).

²⁵⁴ MINN. STAT. § 116.07(4a)(a) (2017).

²⁵⁵ Kristie M. Ellickson et al., *Cumulative Risk Assessment and Environmental Equity in Air Permitting: Interpretation, Methods, Community Participation and Implementation of a Unique Statute*, 8 INT. J. ENVTL. RES. PUB. HEALTH 4140, 4142 (2011).

²⁵⁶ See MINN. POLLUTION CONTROL AGENCY, CUMULATIVE AIR EMISSIONS RISK ANALYSIS AT THE MPCA-BACKGROUND DOCUMENT 1–2 (2009), <http://www.pca.state.mn.us/lupg42d> [<https://perma.cc/6MPX-XNWK>]; see also Ellickson et al., *supra* note 255, at 4143.

²⁵⁷ Ellickson et al., *supra* note 255, at 4153.

²⁵⁸ *Id.* at 4155.

²⁵⁹ MINN. STAT. §§ 116D.01–116D.11 (2017).

assessment of exposure to air pollution.²⁶⁰ The focused mandate lead to definitive analytical response by the Minnesota Pollution Control Agency.

B. Toxics: Using a Cumulative Impacts Lens to Evaluate Decisions

As another example of where regulation might benefit from a cumulative impacts lens, recall that the major federal chemicals and pesticide statutes authorize EPA to regulate chemicals or pesticides that present an “unreasonable risk” to public health or the environment. While those statutes—the Chemical Safety Act and FIFRA—do not speak directly to cumulative risk, it is apparent that risk from combined exposures to multiple chemicals or pesticides lies at the heart of the public health concerns in this area.²⁶¹ (Recall the earlier example of endocrine disrupting chemicals and their pervasiveness in consumer products and the ambient environment.) When those real world concerns are paired, in the case of the Chemical Safety Act, with a statute that requires the EPA to “consider all relevant factors” in its risk determination,²⁶² it becomes quite obvious that the EPA should be assessing risk from combined exposures as part of its risk assessment.²⁶³

Admittedly, cumulative risk assessments are complicated, time consuming, and suffer from real informational gaps.²⁶⁴ Still, regulators that embraced a cumulative impacts lens would ostensibly be more apt to ask for cumulative risk testing,²⁶⁵ which in turn would eventually start to fill the knowledge void. Likewise, regulating through a cumulative impacts lens could encourage more conservative assumptions about risks from chemicals exposure.

If this sounds too complicated or radical, consider that the California EPA already does this as part of the mandates of California’s Proposition 65 legislation. To supplement the federal regime, California adopted Proposition 65 to address chemicals regulation.²⁶⁶ In addition to imposing a disclosure requirement (discussed later), Proposition 65 prohibits businesses from discharging toxic chemicals into drinking water supplies.²⁶⁷ Because liability turns on specified risk levels, the statute contains a number of provisions addressing how risk from chemicals exposure ought to be calculated.²⁶⁸ To account for uncertainty in assessing cumulative risk, for

²⁶⁰ *Citizens Advocating Responsible Dev. v. Kandiyohi Cty. Bd. of Comm’rs*, 713 N.W.2d 817, 832–34 (Minn. 2006).

²⁶¹ See generally Knudsen, *supra* note 144 (explaining the compounding consequences of chemical exposure).

²⁶² 15 U.S.C. § 2604(b)(4)(A)(ii) (2016) (requiring the EPA in making its “unreasonable risk” finding to “consider all relevant factors” including the effects and magnitude of exposure on human health and the environment).

²⁶³ For an entire article dedicated to making this point, see Knudsen, *supra* note 144.

²⁶⁴ *Id.* at 2332–39.

²⁶⁵ 15 U.S.C. § 2603 (2016).

²⁶⁶ Safe Drinking Water and Toxic Enforcement Act of 1986, CAL. HEALTH & SAFETY CODE §§ 25249.5–25250.25 (2017).

²⁶⁷ *Id.* at § 25249.5.

²⁶⁸ Michael W. Graf, *Regulating Pesticide Pollution in California Under the 1986 Safe*

example, Proposition 65 makes conservative assumptions, e.g. setting the exposure level for reproductive toxicants at one thousand times the actual exposure level.²⁶⁹ As Professor Michael Graf explains “[t]hese conservative statutory assumptions assure that discharges or exposures are assessed in a preventative manner, in effect taking into account—albeit in an approximate fashion—the cumulative effect of the different sources of toxic chemicals to which persons will be exposed.”²⁷⁰

C. *Water: Using a Cumulative Impacts Lens to Evaluate Decisions*

As a final example of where a cumulative impacts lens can help steer policy back to the original goals of environmental law, consider once more the Clean Water Act and its quest to address ambient water quality through the TMDL program. In particular, recall that the TMDL Program, which is supposed to consider cumulative impact and serve as a backstop to impaired waters, has held great promise in theory but has achieved little progress in fact.²⁷¹ Indeed, “[a]s of August 2013, EPA’s assessment of national water quality . . . reported that more than half the nation’s assessed waters do not meet these standards or their designated uses, such as fishing, swimming, or drinking.”²⁷²

Professor Oliver Houck, one of the nation’s leading scholars on TMDLs, has referred to the TMDL program as a “stepchild program.”²⁷³ As Houck explains, the EPA failed to implement TMDLs for two decades after the Clean Water Act was passed, focusing instead on NPDES permitting of point sources.²⁷⁴ The end result was that nonpoint sources of pollution, arising silviculture and agriculture and animal feeding operation and storm water, got out of hand and ate up any progress made on the point source front.²⁷⁵ And while litigation has at various times in history tried to spur TMDL into action, overall, the lack of accountability underpinning the

Drinking Water and Toxic Exposure Act (Proposition 65), 28 *ECOLOGY L.Q.* 663, 671–73 (2001).

²⁶⁹ *Id.* at 673. (“Proposition 65 assumes a lifetime exposure at the level of chemical concentration in the relevant environmental medium (such as air or water). For reproductive toxicants, which may pose an acute risk dependent on the amount of a single dose, Proposition 65 assumes an exposure at one thousand (1,000) times the actual exposure level.”).

²⁷⁰ *Id.*

²⁷¹ RODGERS & BURLESON, *supra* note 193, at § 3:7 (“Looking back twelve to fifteen years later, the 1972 Amendments stand as a monumental achievement. But it could be said that the Clean Water Act has missed or dealt ineffectively with pollution by toxics, raw sewage overflows, nonpoint sources, pollution from vessels and federal facilities, long-range transport, and natural deterioration processes.”).

²⁷² U.S. GOV. ACCOUNTABILITY OFF., *CLEAN WATER ACT: CHANGES NEEDED IF KEY EPA PROGRAM IS TO HELP FULFILL THE NATION’S WATER QUALITY GOALS 1* (2013), <http://www.gao.gov/assets/660/659496.pdf>. [<https://perma.cc/54XH-3JMF>].

²⁷³ HOUCK, *supra* note 194, at 10,210.

²⁷⁴ *Id.* at 10,209.

²⁷⁵ *Id.* at 10,209–10.

allocation process has failed to move TMDLs beyond a number crunching exercise.²⁷⁶

These failures beg an important question: how would a cumulative impacts lens in judicial review help? After all, the Clean Water Act already sets up a seemingly rational approach for integrating the regulation of individual dischargers with the maintenance of ambient water quality. Ostensibly, individual discharge permits should already consider the effect of the discharge on water quality standards. These permits should be written so as not to violate water quality standards. And ostensibly, for those waterways where a TMDL exists, there should already be some measure as to the amount of loading from point sources that are collectively permissible.

Theory and aspirations aside, whether permit writers and TMDL developers actually coordinate is unclear. In June 2015, the EPA Region 9 published a document addressing best practices for coordinating individual permits and TMDL limits.²⁷⁷ While careful to state that the document was not an official EPA policy and did not even rise to the level of guidance, the stated reason for the document was the EPA Region 9's belief that "many TMDLs are written in ways that make them difficult to implement through permits and, conversely, many NPDES permits contain effluent limitations that do not accurately implement the intent of associated TMDLs."²⁷⁸ If this is true, then strengthening the importance of cumulative impacts in the judicial review framework could encourage all permit writers to refocus their efforts to heed the "best practices" laid out by Region 9, especially when these practices are dictated by the underlying statutory structure in any event.

CONCLUSION

Cost does not corner the market on relevance. But when cost is treated as king, one could rightfully observe that makers of policy—legislators, lawyers, judges, politicians, regulators, scholars—risk losing sight of the core principles that drive the enterprise of environmental law. Chief among those, this article argues, is the mission of minimizing adverse public health or ecological consequences from collective action.

If addressing the consequences of collective action is the ultimate measure of successful environmental regulation, then judicial review frameworks ought to recognize cumulative impacts as an indispensable part of agency decisionmaking. Translated to legal terms, this means accepting a wider net, a longer leash, and a more mature perception on what are the attenuating benefits or harms of regulatory decisions. This means that when questions arise—like should cobenefits and

²⁷⁶ *Id.* at 10,210–11.

²⁷⁷ EPA REGION 9, HELPFUL PRACTICES FOR ADDRESSING POINT SOURCES AND IMPLEMENTING TMDLS IN NPDES PERMITS (2015), <https://www3.epa.gov/region9/water/npdes/pdf/r9-tmdls-npdes-permits-helpful-practices-2015-06.pdf> [<https://perma.cc/SWR3-YC9X>].

²⁷⁸ *Id.* at 4.

intergenerational harm be evaluated, or should upland development near streams be analyzed for their impairment of tribal treaty rights in downstream estuaries—there is an identifiable principle within regulatory decision making that recognizes the relevance of cumulative and long term impacts. It means that statutes containing regulatory thresholds keyed to public health risks should be understood to include cumulative risk from combined exposures as an indispensable part of decisionmaking. It means that coordinating TMDLS with discharge permits is not just an issue of best practices, but of nonarbitrary decisionmaking.

In the end, whether one applauds infusing agency deference and statutory interpretation with a good dose of pragmatism could depend on individual views about the factors that courts find central to the decisionmaking process. The sensible check on that pragmatism, therefore, may be the very approach taken by this article: to identify other factors in addition to cost that ought to enjoy the status as centrally relevant, lest the judiciary adopt the power of bending environmental law too far away from the public health protections that lie at the heart of collective action problems they were meant to solve.