COMMENTS

COVID-19 AND ENVIRONMENTAL LAW

by Arden Rowell

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The COVID-19 pandemic will have far-reaching and even transformative implications for environmental law. Although the future trajectory of the pandemic remains uncertain, it has already brought many changes to how people live, and is likely to bring many more. Some of these changes relate directly to how people behave and how those behaviors affect the environment. For example, the mass global shift to "staying home" has led to extraordinary decreases in production and transportation—and thus to significant reductions in pollution associated with those behaviors. Other changes, less immediately obvious, relate to shifts in background risk: COVID-19, for example, may increase survivors' vulnerability to pollution in the future, even as it preys disproportionately on those who have been impacted by pollution in the past. Still other—though yet more speculative—changes may be triggered by COVID-19, including changes in people's social values and approach toward the environment, and economic and resource changes as COVID-19 affects the global, national, and local economies.

This Comment explores four important types of change triggered by the pandemic: (1) behavioral changes (including behaviors with environmental impacts); (2) changes in values (including regarding the environment); (3) demographic changes that affect levels of background risk against which laws (including environmental laws) operate; and (4) changing resources (including those that can be spent on environmental or other amenities). Each of these changes has potentially important implications for the assumptions built into environmental law, for the ability of environmental law to effectively regulate the environment, and for the way that humans will interact with the environment in coming years and decades.

Considering each of these types of change, and the impacts such changes may have on how environmental law operates, may help lawmakers in developing reflective, effective strategies as the pandemic progresses. Such planning is particularly important now, as society prepares for a prolonged period of physical, emotional, economic, and environmental recovery.

I. Behavioral Changes and Environmental Impacts

Generally speaking, environmental law seeks to shape human behavior in light of its environmental impacts.[1] Yet environmental laws were all designed to operate on the basis of pre-pandemic presumptions about human behaviors and the environmental impacts of those behaviors. As a result, significant changes either in human behavior—or in its impacts —knock environmental laws off-balance, leaving them trying to regulate behaviors that no longer exist, missing behaviors that do exist, or regulating on the basis of impacts that are no longer likely to come to fruition.

The pandemic is already creating disconnects of these kinds, decreasing some behaviors (such as transportation and production, and their attendant pollution, as well as pressure on national parks) and increasing others (such as generating medical and plastic waste, and production and use of disinfectants). There are preexisting regulatory schemes in place to manage the environmental impacts of each of these behaviors—waste management systems to address hazardous medical waste; air pollution policies to address preexisting conventional air pollution levels; water pollution policies designed to address pre-pandemic dumping and water use; and in many areas of the world, greenhouse gas emission policies to address climate change emissions. Yet these schemes were calibrated to pre-pandemic conditions, and many will need revisitation—if not complete revision—in the coming months and years.

For environmental law, much will turn upon whether the environmental impacts of the unprecedented recent behavioral changes, undertaken to address the extraordinary risks of COVID-19, are constructed as creating a "new normal," or whether they are treated as a kind of extended exception to the pre-pandemic status quo. Perceptions of the status quo play an important role in law in

1. *See* Arden Rowell & Kenworthey Bilz, The Psychology of Environmental Law (NYU Press, forthcoming 2021) (discussing the central role behavioral assumptions play in environmental law).

general,[2] and in environmental law in particular[3]; generally speaking, losses from the status quo are perceived as painful—far more so than gains from the status quo are perceived as pleasant.[4] Identification of a status quo thus has a powerful psychological impact, in that it identifies an endowment baseline against which subsequent losses (or gains) will be measured.[5] Yet construction of the status quo is a social and psychological enterprise, which involves choosing among multiple possible reference points.[6]

In the context of the pandemic, this poses the question of which level(s) of environmental quality will and should be seen as the reference point. More specifically, do recent mass behavioral changes in response to the pandemic—which seem to be resulting in impacts as diverse as cleaner air[7] and often cleaner water,[8] exploding animal populations,[9] changing pressures on national parks[10] and wildlife,[11] reduced greenhouse gas emissions,[12] increased medical[13] and plastic waste,[14] reduced use of mass transit,[15] and reduced incentives for natural resource extraction[16]—constitute a new normal, against which future policies should be evaluated, in light of environmental and other impacts? Does degradation back to pre-pandemic environmental quality constitute a loss, or merely a return to the status quo?

To see why these questions have heightened importance within environmental law, it is worth recognizing that the principle of "antidegradation" remains highly influential in environmental policy, and plays a central role in how pollution control schemes operate both domestically and internationally. This concept, imbedded deeply within norms of environmental conservation and preservation, operationalizes the presumption that environmental quality should not degrade—and in doing so, purposefully creates a one-way ratchet toward *increasing* the stringency of environmental protection. For example, the Clean Water Act (CWA)[17]—which has as one of its principal objectives to "maintain the chemical, physical, and biological integrity of the Nation's waters"[18]—is routinely read to impose antidegradation requirements for maintaining and protecting water quality that has already been achieved.[19] Notably, in the United States, legally enforceable antidegradation requirements have been upheld even where they require states or localities to maintain waters at a higher quality than would otherwise be necessary to satisfy the statutory requirements of the CWA.[20]

Shall such antidegradation requirements also be used to uphold pandemic-related improvements in environmental quality—such as those that come from pandemic-driven decreases in industrial production, or reductions in transportation and travel? Though the principle of antidegradation has a long history within conservation, sustainability, and other environmental traditions, it has never before had to grapple with this type of mass global behavioral change, and with the extraordinary impacts of those changes on environmental quality. But does this mean that this is a once-in-a-lifetime opportunity for "locking in" environmental improvements by continuing to implement antidegradation requirements as usual—or that applying a general principle to extraordinary circumstances is unreasonable and inappropriate, a co-opting of catastrophe to environ-

2. *See, e.g.*, Richard Thaler & Cass Sunstein, Nudge: Improving Decisions About Health, Wealth, and Happiness (Penguin Books 2008) (describing the impact of default rules, status quo bias, and the endowment effect across multiple legal and policy realms, and advocating for purposeful arbitrage of those effects to promote public policy).
3. *See* Rowell & Bilz, *supra* note 1 (discussing the importance of status quo bias to the psychology of environmental law, including within the scholarly traditions of conservation and sustainability); Arden Rowell & Josephine A.W. van Zeben, *The New Status Quo of the Paris Agreement: The Psychological Impact of the 2 Degrees Aspiration*, 7 Eur. J. Risk Reg. 49 (2016) (discussing the potential impact of changing status quo perceptions in international environmental law context).
4. *See* Daniel Kahneman et al., *Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias*, 5 J. Econ. Persp. 193 (1991); Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 Econometrica 263 (1979); William Samuelson & Richard Zeckhauser, *Status Quo Bias in Decision Making*, 1 J. Risk & Uncertainty 7 (1988); Richard H. Thaler, *Toward a Positive Theory of Consumer Choice*, 1 J. Econ. Behav. & Org. 39 (1980).
5. *See* Rowell & van Zeben, *supra* note 3.
6. Behavioral approaches to law and policy often depend upon the malleability of reference points to achieve public policy ends. *See, e.g.*, Thaler & Sunstein, *supra* note 2; *see also* John T. Jost et al., *A Decade of System Justification Theory: Accumulated Evidence of Conscious and Unconscious Bolstering of the Status Quo*, 25 Pol. Psychol. 881 (2004) (reviewing evidence that suggests that once a state of the world is believed to represent the status quo, people will work both consciously and subconsciously to justify and promote that state of the world); Lawrence Lessig, *The Regulation of Social Meaning*, 62 U. Chi. L. Rev. 943, 978-79 (1995) (discussing conscious and subconscious construction of "traditions").
7. *See, e.g.*, Kai Chen et al., *Air Pollution Reduction and Mortality Benefit During the COVID-19 Outbreak in China*, 4 The Lancet E210 (2020).
8. *See, e.g.*, Ali P. Yunus et al., *COVID-19 and Surface Water Quality: Improved Lake Water Quality During the Lockdown*, 731 Sci. Total Env't 139012 (2020).
9. *See, e.g.*, Erik Stokstad, *News: The Pandemic Stilled Human Activity. What Did This "Anthropause" Mean for Wildlife?,* Science, Aug. 13, 2020, https://www.sciencemag.org/news/2020/08/pandemic-stilled-human-activity-what-did-anthropause-mean-wildlife.
10. *See, e.g.*, Andrew R. Chow, *National Parks Are Getting Trashed During COVID-19, Endangering Surrounding Communities*, Time, July 22, 2020, https://time.com/5869788/national-parks-covid-19/.
11. *See, e.g.*, Annie Roth, *Poachers Kill More Rhinos as Coronavirus Halts Tourism to Africa*, N.Y. Times, July 6, 2020, https://www.nytimes.com/2020/04/08/science/coronavirus-poaching-rhinos.html.
12. *See* Corinne Le Quéré et al., *Temporary Reduction in Daily Global CO_2 During the COVID-19 Forced Containment*, 10 Nature Climate Change 647 (2020) (finding a reduction of 17% in daily emissions during April 2020, compared to the average global daily emissions in 2019).
13. *See, e.g.*, Siming You et al., *COVID-19's Unsustainable Waste Management*, 368 Science 1438 (2020), https://science.sciencemag.org/content/368/6498/1438.1.
14. *See* Ana L. Patricio Silva et al., *Increased Plastic Pollution Due to COVID-19 Pandemic: Challenges and Recommendations*, 405 Chem. Eng. J. 126683 (2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7430241/.
15. *See* Alejandro De La Garza, *COVID-19 Has Been Apocalyptic for Mass Transit. Will Congress Offer More Help?*, Time, July 21, 2020, https://time.com/5869375/public-transit-coronavirus-covid/.
16. *See, e.g.*, Clifford Krauss, *Coronavirus Adds to Pressure for U.S. Oil Industry*, N.Y. Times, Feb. 5, 2020, https://www.nytimes.com/2020/02/04/us/oil-coronavirus.html.
17. 33 U.S.C. §§1251-1387, ELR Stat. FWPCA §§101-607.
18. CWA §101(a) (2020).
19. *See, e.g.*, U.S. Environmental Protection Agency, Water Quality Standards Handbook—Chapter 4: Antidegradation (2012), https://www.epa.gov/sites/production/files/2014-10/documents/handbook-chapter4.pdf (providing a history of antidegradation policy in water quality, and an overview of current approaches to antidegradation).
20. *See id.*

mental ends? Legal decisionmakers will soon be faced with this question across wide-ranging environmental contexts.

As a concrete example of how complex this is likely to become, consider the widespread improvements in air quality that accrued as a result of COVID-related shutdowns.[21] In the United States, conventional air pollution is primarily regulated by the gargantuan Clean Air Act (CAA),[22] a multifaceted statute that some say rivals the U.S. tax code in complexity. Huge portions of the CAA rest upon the determination of whether (based on past behaviors and emissions) a state has achieved safe levels of air pollution—whether it is in "attainment"—or whether (based on past behaviors and emissions) the state continues to have air pollution concentrations that pose a potential danger to the public health—a status deemed "nonattainment." Broadly speaking, cleaner attainment states get more latitude under the CAA to allow for new industry and new sources of pollution, while pollution sources in dirtier nonattainment states are subject to substantially more regulation (since they are presumed to pose a greater risk to public health).[23]

Historically, some portions of the country have had serious struggles in achieving attainment; most famously, southern California—challenged by high population, significant production, significant dependence on cars, and unfavorable climactic conditions—has been in nonattainment since the CAA was passed.[24] Past analyses suggested that the only way to actually achieve attainment in the region would be to shut down significant portions of industry and transportation—an outcome widely viewed as completely infeasible, a political and practical nonstarter.[25] But during the pandemic—at least prior to recent catastrophic wildfires—Los Angeles enjoyed the longest period of high air quality days since 1995 and had the potential for reaching attainment for the first time.[26]

Does this change, and should this change, how legislators, regulators, states, and courts think about what is attainable, achievable, or feasible—for southern California, for regulated industries, or for areas around the globe? And if southern California or any region were to slip into (temporary) attainment as a result of pandemic-era behaviors, what does that mean for that region's future status and for the various exceptions it has garnered on the basis of its high pollution levels? Internationally, similar questions may be expected in regards to greenhouse gas emissions, which also decreased substantially during the early pandemic.[27]

One important aspect of this puzzle is that, by and large, environmental law, like many areas of law, lacks "surge" capacity: the ability to scale up and down with large and correlated shifts of risk and behavior. Indeed, environmental laws generally fail to anticipate seismic behavioral shifts, much less stepwise adjustments that are likely to occur as society finds ways to reintegrate in the latter stages of the pandemic and, hopefully, post-pandemic. There is, for example, no provision in the CAA for states in "temporary attainment" as a result of emergency economic shutdown; much less a plan imbedded in the Act for addressing a gradual return to business and the sudden changes in emissions likely to follow, for example, resumption of industrial activities, or a return to commutes.[28] While some environmental laws have emergency exemptions written or read into them,[29] such provisions were designed to address temporary imminent threats and operate like binary on/off switches, either applying or not applying. This is likely to prove challenging to apply in the coming months and even years, as state and federal policies on reintegration create coordinated stepwise shifts in behavior.

As an example, consider how environmental impact statements are likely to operate in the late pandemic. Generally speaking, the National Environmental Policy Act (NEPA)[30] imposes a set of informational and analytical requirements on major federal actions with the potential of significantly affecting the environment.[31] In the past, if the federal government wanted to build a new research facility or open up large tracts of public land to public access or use, generally, it would need to perform an environmental impact statement analyzing the expected environmental impacts, and their alternatives, before engaging in the action. Some states have similar requirements that apply to state actions, as do most countries around the world.

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21. For a project tracking global changes in air pollutant levels since the World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020, see Environmental Tracking Project, *Tracking the Environmental Impacts of COVID-19*, https://www.environmentaltrackingproject.org/p/air-quality-impacts-of-covid-19.html (last visited Sept. 14, 2020). For an updated list of resources and analyses of the relationship between COVID-19 and air pollution, see the updated resource maintained by *Nature Magazine* at https://go.nature.com/covid19airpollution.
22. 42 U.S.C. §§7401-7671q, ELR Stat. CAA §§101-618.
23. For an overview of the U.S. approach to air pollution, see Arden Rowell & Josephine van Zeben, A Guide to U.S. Environmental Law (California Press, forthcoming 2021). For a comparison to European Union (EU) air pollution policy, which is also based on measurements of past behaviors and impacts, see Josephine van Zeben & Arden Rowell, A Guide to EU Environmental Law 99-111 (California Press, forthcoming 2020).
24. *See* South Coast Air Quality Management District, *Clean Air Plans*, http://www.aqmd.gov/home/air-quality/clean-air-plans (last visited Sept. 14, 2020).
25. *See, e.g.*, Coalition for Clean Air v. U.S. Env'tl Prot. Agency, 971 F.2d 219, 22 ELR 21274 (9th Cir. 1992), *cert. denied*, 507 U.S. 950 (1993) (reviewing the U.S. Environmental Protection Agency's (EPA's) analysis that achieving the national ambient air quality standards in the South Coast Air Basin over Los Angeles would require imposing "across the-board, draconian measures devastating to the country's largest industrial area").
26. Julie Cart, *As Californians Stay at Home, Air Quality Improves—For Now*, CalMatters, Apr. 12, 2020, https://calmatters.org/health/2020/04/as-californians-stay-at-home-air-quality-improves-for-now/; Drew Kann, *Los Angeles Has Notoriously Polluted Air. But Right Now It Has Some of the Cleanest of Any Major City*, CNN, Apr. 7, 2020, https://www.cnn.com/2020/04/07/us/los-angeles-pollution-clean-air-coronavirus-trnd/index.html.
27. *See* Le Quéré et al., *supra* note 12.
28. The best option may be for EPA to consider issuing a "SIP [state implementation plan] call" under CAA §110(k)(5) for states whose air pollution has been substantially impacted by COVID-related shutdowns. This may be particularly important for areas, like the South Coast Air Basin, where COVID-related behavioral shifts may trigger oscillation between attainment and nonattainment status. A more general call could also be used to encourage states to consider the possibility of maintaining at least some of the COVID-related increases in air quality.
29. *See* Michael B. Gerrard, *Emergency Exemptions From Environmental Laws*, *in* Law in the Time of COVID-19 81 (Katharina Pistor ed., Columbia Law School 2020) (e-book), https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1239&context=books.
30. 42 U.S.C. §§4321-4370h, ELR Stat. NEPA §§2-209.
31. 42 U.S.C. §4332.

There is an emergency exemption to NEPA—not in NEPA itself, but built into the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which President Donald Trump invoked for the United States on March 13, 2020, when he declared a national emergency.[32] The exemption applies to immediate responses to the national emergency, and it means that by and large, decisions by federal actors to respond to the imminent emergency created by the pandemic—by shutting down parks and public lands, limiting transportation, suspending enforcement actions, and building field hospital installations—will be exempt from the requirements of NEPA. (The legal situation is much more complicated when it comes to attempts to extend the emergency exception to actions that do not have an obvious direct relationship to the emergency, as with President Trump's June 4, 2020, Executive Order purporting to exempt routine infrastructure projects from NEPA.[33]) State actions implementing social distancing and stay-at-home orders are likely to have similar exemptions.

But do these exemptions apply to actions designed to return—or partially return—to pre-pandemic normal? National parks could presumably be closed in an emergency, with a clear exemption from any analytical requirements under NEPA under the Disaster Relief and Emergency Assistance Act. But were they also permitted to be reopened—with all the (sudden) environmental impacts of (new) visitors[34]—without an analysis of the environmental impacts of various reopening plans? Or, in other words, do emergency exemptions apply outside of emergency conditions, to resumptions of pre-emergency behaviors?

For "slow" emergencies like a pandemic, such questions are particularly thorny—and made more so by legal requirements like those under NEPA, where the justification for emergency exemption is based upon a presumption of urgency and the need to act without the procedural burdens of considered analysis. Such a presumption might well apply to initial actions (e.g., closing parks) but not to the more gradual, less time-pressured decisions of when and how to "undo" those actions (e.g., reopening parks). The answer may depend at least partly on whether such actions are constructed as "returns to normal"—where "normal" is constructed as pre-pandemic normal, and the level of environmental quality associated with pre-pandemic behaviors—or whether current behaviors and resulting environmental quality are instead taken as the baseline for evaluation. Law likely has some power to affect which of these presumptions holds true,[35] yet there is no obvious answer to which of them is best.

32. *See id.*; *see also id.* §5122(b).
33. *See* Exec. Order No. 13927, Accelerating the Nation's Economic Recovery From the COVID-19 Emergency by Expediting Infrastructure Investments and Other Activities, 85 Fed. Reg. 35165 (June 9, 2020).
34. The puzzle will be made even more difficult by the possibility that the uncontrolled opening of parks would lead not only to a return to prior visitor numbers, but even to the possibility of massively increased visitors, driven by pandemic-induced cabin fever to seek out the nation's special places.
35. *See* Rowell & Bilz, *supra* note 1 (describing ways that the psychology of perception interacts with environmental law); *see also* Rowell & van Zeben, *supra* note 3 (discussing the interaction between international environmental law and status quo perceptions). For a more general discussion of how law can affect constructions of social meaning, see Lessig, *supra* note 6.

II. Changes in Values

Existing environmental laws were adopted in light of social values and public commitments that existed pre-pandemic. Yet massive disruptive events, such as pandemics, can have far-reaching impacts on the normative and political values that people hold.[36] In fact, recent research in sociology has pointed to ways in which disruption and disaster predictably lead to changes in social values, often in ways that encourage refocusing and redefining the social meaning of social behaviors, membership in groups, and status.[37] Other research in psychology suggests that people perceive and value risks differently when they perceive themselves to be under threat or under conditions of anxiety, and that these perceptions can be enough to measurably shift their normative and political values.[38]

From this perspective, it seems possible—even likely—that the pandemic will create changes in people's values and normative commitments.[39] At least some of these values and commitments may relate to the way people engage with the natural environment and to the way that they perceive, give meaning to, and reevaluate the risks and benefits of certain relationships with the natural world.

On the risk side, for instance, we have already seen some movement toward addressing the types of human-wildlife interactions that are fostered in wildlife markets, such as the Wuhan "wet market," where the novel coronavirus reportedly made the first jump from animal to humans.[40] While environmental and animal rights activists had been advocating for the shutdown of such markets for some time—as well as for other types of international wildlife trade[41]—the realities of the current pandemic may help in

36. *See* Hendrik Vollmer, The Sociology of Disruption, Disaster, and Social Change (Cambridge Univ. Press, 2013) (exploring the sociological mechanisms that lead to social change and changing values in the wake of mass disruptions and disasters).
37. *See id.*
38. *See, e.g.*, Richard Doty et al., *Threat and Authoritarianism in the United States, 1978-1987*, 61 J. Personality & Soc. Psychol. 629 (1991) (finding that perceptions of heightened societal threat lead to changes in political values, toward increased preference for authoritarianism); Jennifer Lerner & Dacher Keltner, *Fear, Anger, and Risk*, 81 J. Personality & Soc. Psych. 146 (2001) (discussing the psychological impacts of fear and anxiety on risk perception). For discussion of the implications of the psychology of risk perception within environmental law, see Rowell & Bilz, *supra* note 1.
39. *See, e.g.*, Kevin Morrell, *Values in the Age of Coronavirus: How a Disease Changed What It Means to Live a Virtuous Life*, Conversation, May 4, 2020, https://theconversation.com/values-in-the-age-of-coronavirus-how-a-disease-changed-what-it-means-to-live-a-virtuous-life-136998.
40. *See, e.g.*, Quint Forgey, *"Shut Down Those Things Right Away": Calls to Close "Wet Markets" Ramp Up Pressure on China*, Politico, Apr. 3, 2020, https://www.politico.com/news/2020/04/03/anthony-fauci-foreign-wet-markets-shutdown-162975; Kate Ng, *Coronavirus: WHO Urges China to Close "Dangerous" Wet Market as Stalls in Wuhan Begin to Reopen*, Independent, Apr. 13, 2020, https://www.independent.co.uk/news/world/asia/coronavirus-china-cases-deaths-who-wet-market-wuhan-a9462286.html; Jackie Northam, *Calls to Ban Wildlife Markets Worldwide Gain Steam Amid Pandemic*, NPR, Apr. 19, 2020, https://www.npr.org/2020/04/19/838073215/calls-to-ban-wildlife-markets-worldwide-gain-steam-amid-pandemic; Sigal Samuel, *The Coronavirus Likely Came From China's Wet Markets. They're Reopening Anyway*, Vox, Apr. 15, 2020, https://www.vox.com/future-perfect/2020/4/15/21219222/coronavirus-china-ban-wet-markets-reopening.
41. *See, e.g.*, *Fighting the Illegal Wildlife Trade*, World Wide Fund for Nature, Apr. 12, 2011, https://wwf.panda.org/?200010/Fighting-the-illegal-wildlife-trade; Chia-Yi Hou, *Wildlife Trade 101*, Nat. Res. Def. Council,

shaping public and government perceptions and valuations of the risks associated with these behaviors.

Alternatively, consider that long times spent indoors may be encouraging people to reflect on their normative commitments and values, to miss exposure to nature.[42] The closure of many national, state, and local parks may lead people to reassess the value of those spaces, and perhaps even to adjust what they see as their importance. More ambitiously, the pandemic may influence what people see as possible or even reasonable responses to large societal problems. Optimistically, for instance, mass changes in behavior precipitated by the pandemic may make future mass behavioral changes—such as those that might be necessitated by effective management of climate change, such as substantially reducing travel—more imaginable, and thus more likely to occur.

Note that value change, while it complements and relates to behavioral change, is not cabined by it. Handwashing habits, for example, have long been relatively durable—much to the frustration of many in public health.[43] Some psychologists have suggested that changing durable habits like handwashing may actually require exogenous shocks to trigger durable behavioral change.[44] Periods of disruptive change, such as an infectious disease epidemic, may thus present an opportunity for behavioral change[45]; and indeed, in the context of the COVID-19 pandemic, there is early research suggesting that many people have actually changed their handwashing behaviors due to COVID-19.[46] As behaviors shift, values may shift as well. Someone walking out of a public bathroom without washing his or her hands may be viewed and stigmatized differently post-COVID than pre-COVID, for example.[47]

Such perceptions may, in turn, affect the underlying behaviors themselves, given research suggesting that people are more likely to change behaviors like handwashing when they perceive that social norms support those behaviors.[48] At the same time, changing behaviors and background risks—such as are discussed below—may also begin to change the social meaning of many environmental behaviors. Use of reusable cups, bags, and other non-single-use items, for example, was targeted early as a potential source of infectious spread; many municipalities and businesses responded by banning reusable items. Subsequent scientific research has suggested that the danger of spread from fomites—and thus reusable items—may actually be quite limited,[49] yet it is possible that the social meaning attached to using reusable items may well have shifted, regardless of underlying risks.[50]

III. Demographic Changes and Changes in Baseline Risk

A third type of changes triggered by the COVID-19 pandemic relates to the shifts the pandemic has caused and is causing in background levels of risk. In addition to being calibrated to pre-pandemic expectations about human behavior, environmental laws were also calibrated according to pre-pandemic expectations about pre-pandemic demographics, exposures, and risks.

In the United States, for example, the national ambient air quality standards—the centerpiece of the CAA—are set at levels that are "requisite to protect the public health," and that allow "an adequate margin of safety."[51] Setting tolerable levels of air pollution requires risk analyses that evaluate the impact of air pollutants on public health—an evaluation that is informed, among other things, by

Aug. 15, 2019, https://www.nrdc.org/stories/wildlife-trade-101; Wildlife Alliance, *Wildlife Rapid Rescue Team (WRRT)*, https://www.wildlifealliance.org/wildlife-police/ (last visited Sept. 14, 2020).

42. *See*, *e.g.*, Craig Childs, *As COVID-19 Spreads, How Do You Ethically Get Outdoors?*, Grist, Mar. 25, 2020, https://grist.org/justice/as-covid-19-spreads-how-do-you-ethically-get-outdoors/; Becky Kleanthous, *I've Been Missing the Outdoors Since Lockdown Started, so I've Spent $265 Trying to Make My Home Feel Like a Park*, Bus. Insider, Apr. 15, 2020, https://www.businessinsider.com/personal-finance/miss-the-outdoors-during-quarantine-spending-money-home-park-2020-4; Interview by Steve Curwood with Richard Louv, Author, Public Radio International (Apr. 8, 2020), https://www.pri.org/stories/2020-04-08/connecting-nature-time-covid-19.
43. *See* World Health Organization, WHO Guidelines on Hand Hygiene in Health Care §18.2 (2009), *available at* https://www.ncbi.nlm.nih.gov/books/NBK144052/ ("The inability over two decades to motivate . . . compliance with hand cleansing suggests that modifying hand hygiene behavior is a complex task.").
44. *See* Bas Verplanken & Wendy Wood, *Breaking and Creating Habits: Consequences for Public Policy Interventions*, 25 J. Pub. Pol'y & Marketing 90 (2006) (discussing the durability of habits to informational and other policy interventions, and arguing that "[s]uccessful habit change interventions involve disrupting the environmental factors that automatically cue habit performance").
45. *See* Arden Rowell, *Regulating Fear: The Case of Ebola in the United States* (2014), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2513130.
46. *See Vast Majority of Americans Increase Hand Washing Due to Coronavirus*, Occupational Health & Safety, Apr. 20, 2020, https://ohsonline.com/articles/2020/04/20/vast-majority-of-americans-increase-hand-washing-due-to-coronavirus.aspx (reporting that, as of April 2020, 90% of American respondents said they are washing their hands more frequently, more thoroughly, and for longer, and 78% wash their hands six or more times a day, in comparison to just 37% who washed that often prior to the outbreak).
47. Consider in this light the comment from Fox News presenter Pete Hegseth in 2019 that "I don't think I've washed my hands for 10 years." *See* Bruce Y. Lee, *Why Fox News' Hegseth Said He Hasn't Washed His Hands in 10 Years*, Forbes, Feb. 11, 2019, https://www.forbes.com/sites/brucelee/2019/02/11/why-fox-news-pete-hegseth-hasnt-washed-his-hands-in-10-years/#6b751b8f1238. Post-COVID, that type of statement may gather additional—and different—social meaning, and may convey different information about the risks that Hegseth imposes on those around him. *See*, *e.g.*, Zaria Gorvett, *The Reason Why Some People Don't Wash Their Hands*, https://www.bbc.com/future/article/20200417-the-hidden-reasons-some-people-dont-wash-their-hands (using Hegseth as an example of a recalcitrant non-hand-washer).
48. *See* Rachel Dickie et al., *The Effects of Perceived Social Norms on Handwashing Behaviour in Students*, 23 Psych. Health & Med. 154 (2017), *available at* https://www.tandfonline.com/doi/abs/10.1080/13548506.2017.1338736.
49. *See* Health Expert Statement Addressing Safety of Reusables and COVID-19 (2020), https://storage.googleapis.com/planet4-international-stateless/2020/06/26618dd6-health-expert-statement-reusables-safety.pdf; *see also* Sandra Laville, *Reusable Containers Safe During COVID-19 Pandemic, Say Experts*, Guardian, June 22, 2020, https://www.theguardian.com/environment/2020/jun/22/reusable-containers-safe-during-covid-19-pandemic-say-experts.
50. In his remarkable article *Regulation of Social Meaning*, *supra* note 6, for example, Lawrence Lessig suggests that one way that social meaning shifts—or can be shifted by law—is through "ambiguation," where the social messaging of a behavior is changed by adding an additional message to the original meaning. In regards to reusable containers, for example, early bans on reuse may have ambiguated the prior messages of reuse (e.g., that the user cared for the environment) with new messages about the pandemic or health risk (e.g., that reuse is dirty, dangerous, or evinces a lack of care for people around you). As the social meaning of such behaviors shifts, people may shift their behaviors even where their values remain constant.
51. 42 U.S.C. §7409(b)(1).

demographic information about how many members of the population are elderly and how many have preexisting respiratory ailments.[52] Yet the same quantity of pollution can cause more or less harm, depending upon how the pollution is bunched or spread across the population.[53] The sensitivity of the population matters a great deal. A population with substantially more vulnerable citizens must set tolerable air pollution levels lower to have the same health effects, while a more robust population may tolerate higher pollution levels with fewer health risks.

If COVID-19 leaves the population sicker than it was before,[54] the same levels of air pollution that we tolerated before may actually cause greater—even intolerable—harm.[55] Such impacts may be even further exacerbated if, as some studies now suggest, higher preexisting levels of air pollution also generate worse COVID-19 outcomes to begin with.[56] This would be a grave double whammy for areas such as high-density urban environments, or regions in the world (including the industrialized portions of China) where preexisting vulnerability to COVID-19 from high air pollution levels might lay open the population to increased long-term health effects from COVID-19—health effects that will then make that same population more vulnerable to increased air pollution, when or if air pollution returns to pre-COVID levels.[57]

Other more general and rarely considered presumptions imbedded in environmental law have to do with studies setting baseline exposure rates, which are used to calculate how much additional pollution a person might be safely exposed to.[58] These baseline exposure rates have also been set with pre-COVID presumptions of behavior—and, in many cases, those presumptions are now wildly wrong. As a simple example, consider that existing estimates of exposure to dangerous substances and pollutants are largely based upon the presumption that a significant portion of a person's day is spent outside their home—something that is no longer true for the millions of people who now work remotely or who have no outside workplace to go to. At the least, presumptions on existing exposures may need to be adjusted to account for the (indoor) environments in which people are living; somewhat more ambitiously, this may be a moment for environmental law to expand its viewpoint to incorporate indoor as well as outdoor environments—something with which the field has long struggled.[59]

Other examples are also readily found, however; consider that people may now be exposed to disinfectant residues in far greater quantities than has been presumed in the past for purposes of setting environmental regulations, such as the U.S. Environmental Protection Agency's (EPA's) rules under the Safe Drinking Water Act (SDWA)[60] addressing disinfectant byproducts,[61] or that air quality standards have been set by reference to a set of now-outmoded presumptions about the numbers of people engaging in outdoor exercise.[62] Regulators have a great deal of work to do to update these presumptions, and, in the meantime, individuals should be aware of the limitations of the past risk analyses regulators have done.

IV. Changes in Resources

Finally, the pandemic is leading to important shifts in wealth and the availability of resources to address those commitments. Although the full economic impact of the pandemic remains uncertain, at a minimum it imposes multiple opportunity costs: resources spent on face masks, for example, cannot be spent on environmental amenities. If, as some commentators now predict, the pandemic affects national and global wealth, or triggers recession or even depression, the impacts become more profound: poorer societies, like poorer individuals, may have less to spend on the environment, because they have less to spend overall.[63]

52. *See*, *e.g.*, Qian Di et al., *Air Pollution and Mortality in the Medicare Population*, 376 New Eng. J. Med. 2513 (2017), *available at* https://www.nejm.org/doi/full/10.1056/NEJMoa1702747 (discussing the vulnerability of older adults to air pollution); *see also* U.S. EPA, *Study Shows Low Levels of Air Pollution Pose Risk for Older Adults*, Sci. Matters, Jan. 12, 2018, https://www.epa.gov/sciencematters/study-shows-low-levels-air-pollution-pose-risk-older-adults.
53. *See* Arden Rowell, *Allocating Pollution*, 79 U. Chi. L. Rev. 985 (2012).
54. Importantly, early reports show that COVID-19 may cause long-term damage even in many allegedly recovered patients—as many as a third of even "mild" COVID-19 patients are now suspected to have lingering illness and health problems. *See* Mark W. Tenforde et al., *Symptom Duration and Risk Factors for Delayed Return to Usual Health Among Outpatients With COVID-19 in a Multistate Health Care Systems Network—United States, March-June 2020*, Centers for Disease Control & Prevention Morbidity & Mortality Wkly. Rep., July 31, 2020, *available at* https://www.cdc.gov/mmwr/volumes/69/wr/mm6930e1.htm; *see also* Valentina Puntmann et al., *Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19)*, JAMA Cardiology, July 27, 2020, https://jamanetwork.com/journals/jamacardiology/fullarticle/2768916; *What We Know (So Far) About the Long-Term Health Effects of Covid-19*, Advisory Board, June 2, 2020, https://www.advisory.com/daily-briefing/2020/06/02/covid-health-effects.
55. On the other (deeply grim) hand, if COVID-19 leaves the population healthier on average than it was before by removing vulnerable members of the population, it may be possible in the future to tolerate greater concentrations of air pollutants without an increase in total harm.
56. Damian Carrington, *Air Pollution May Be "Key Contributor" to Covid-19 Deaths—Study*, Guardian, Apr. 20, 2020, https://www.theguardian.com/environment/2020/apr/20/air-pollution-may-be-key-contributor-to-covid-19-deaths-study.
57. For treatment of the dangers of underestimating long-term morbidity impacts, see Arden Rowell, *COVID VSLs and the Undervaluation of Pandemic Risk*, Reg. Rev., Aug. 17, 2020, https://www.theregreview.org/2020/08/17/rowell-covid-vsl-undervaluation-pandemic-risk/.
58. *See*, *e.g.*, U.S. EPA, *Exposure Assessment Tools by Lifestages and Populations—Highly Exposed or Other Susceptible Population Groups*, https://www.epa.gov/expobox/exposure-assessment-tools-lifestages-and-populations-highly-exposed-or-other-susceptible (last updated Apr. 29, 2020).
59. *See* Rowell & Bilz, *supra* note 1.
60. 42 U.S.C. §§300f to 300j-26, ELR Stat. SDWA §§1401-1465.
61. *See*, *e.g.*, U.S. EPA, *Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules*, https://www.epa.gov/dwreginfo/stage-1-and-stage-2-disinfectants-and-disinfection-byproducts-rules (last updated June 18, 2020).
62. *See*, *e.g.*, U.S. EPA, Air Quality Index: A Guide to Air Quality and Your Health (2014), https://www3.epa.gov/airnow/aqi_brochure_02_14.pdf. Note that EPA has long had a set of behavioral recommendations based on different levels of air pollution, which include advice to avoid or limit outdoor exercise when air quality decreases to various levels. At the Air Quality Index of 151-200, for example, EPA has long recommended that everyone "limit prolonged outdoor exertion," and that more vulnerable populations should avoid prolonged or heavy outdoor exertion. Such recommendations were developed in a world where indoor exercise provided an alternative, however. The risk-risk trade offs of (polluted) outdoor exercise versus *no* exercise, or exercise in indoor environments that may foster spread of infectious disease, has yet to be performed by EPA or, to my knowledge, anyone else. This thus serves as another example of where apparently neutral recommendations are in fact based on a set of (now questionable) behavioral assumptions.
63. In a very technical sense, note that reductions in wealth should perhaps even trickle into the monetized valuations that are the basis for environmental

And as scarcening government resources are increasingly allocated toward pandemic response, still fewer resources may be available for environmental protection, ecosystem management, and environmental enforcement. Many regions of the world, for example, are reporting increased illegal deforestation as environmental enforcement has been pulled back.[64]

Further, and going beyond wealth impacts, in some cases the pandemic may itself create additional costs or complexity to creating or enforcing environmental laws. While there is no reason to think that such constraints would be universal,[65] some standards based on feasibility may become more challenging to enforce where product chains are disrupted (e.g., if facilities are unable to access chemicals, safety materials, or staffing that they previously relied upon to manage exposures or waste), and environmental audits may become trickier or more costly to do where production facilities have highly variable production schedules or pandemic-related limits on access.[66] Such complexities have been used even in wealthier countries, such as the United States, as a justification for pulling back on environmental enforcement during the pandemic.[67]

V. Conclusion

Where human behaviors, demographics, values, and resources are upended—as in the ongoing catastrophe of this pandemic—we should expect there to be challenges for legal structures and approaches built upon now-outdated assumptions. In the case of environmental law, the "misfit" between past presumptions and emerging conditions is likely to be significant. The time to recognize this potential misfit is now, as governments and communities begin to consider how to construct a new normal.

cost-benefit analyses. It is well-established that the value of a statistical life (VSL) commonly used to monetize mortality impacts of environmental regulations is partially a function of wealth: wealthier people are willing to pay more for risk reduction than are people who are more resource-constrained. *See* Lisa Robinson, *How U.S. Government Agencies Value Mortality Risk Reductions*, 1 Rev. Env't Econ. & Pol'y 283 (2007) (providing an overview of valuation methods). Current VSLs are based upon presumptions about current wealth, and also often now incorporate the presumption that future people will be wealthier than present ones (and thus justify a higher VSL). A long pandemic, or one that creates a durable depression, might undermine that presumption.

64. *See*, *e.g.*, *All Things Considered: Hour* (WBEZ radio broadcast, June 23, 2020) (reporting increased deforestation in Africa, South America, and Southeast Asia as a result of illegal deforestation activity, in light of a shift in government resources toward managing the pandemic).

65. *See*, *e.g.*, E-mail from Environmental Integrity Project, to Susan Bodine, Assistant Administrator for Enforcement and Compliance Assurance, U.S. EPA (Mar. 26, 2020), https://environmentalintegrity.org/wp-content/uploads/2020/04/Final-Letter-to-EPA-re-Coronavirus-Waivers-04.01.2020.pdf (criticizing EPA's March decision to broadly suspend enforcement during the pandemic, on the grounds that many regulated industries can comply with existing laws even in the pandemic).

66. For example, EPA relaxed standards for some disinfectant manufacturers and hand sanitizer manufacturers, citing lessened availability of ingredients for those materials and the importance of disinfectant availability. *See* News Release, U.S. EPA, EPA Continues Efforts to Help Increase the Availability of Disinfectant Products for Use Against the Novel Coronavirus (Mar. 26, 2020), https://www.epa.gov/newsreleases/epa-continues-efforts-help-increase-availability-disinfectant-products-use-against.

67. *See id*. In the United States, EPA has adopted a general policy regarding enforcement discretion that has the effect of significantly loosening enforcement during the pandemic, citing the "challenges resulting from efforts to protect workers and the public from COVID-19" as the reason for allowing a number of new categories of noncompliance. *See* EPA's Temporary COVID-19 Enforcement Policy at *Enforcement Policy, Guidance & Publications*, https://www.epa.gov/enforcement/enforcement-policy-guidance-publications (last updated Sept. 3, 2020), and *COVID-19 Implications for EPA's Enforcement and Compliance Assurance Program*, https://www.epa.gov/enforcement/covid-19-implications-epas-enforcement-and-compliance-assurance-program (last updated Aug. 25, 2020); *see also* News Release, U.S. EPA, EPA Announces Enforcement Discretion Policy for COVID-19 Pandemic (Mar. 26, 2020), https://www.epa.gov/newsreleases/epa-announces-enforcement-discretion-policy-covid-19-pandemic.