

NO MUD PIES: RISK AVOIDANCE AS RISK REGULATION

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INTRODUCTION

The Killarney Lake Recreation Site, in the Lower Coeur d'Alene River Basin, is a popular place for families to camp overnight or to spend the day picnicking, fishing, launching boats, and playing along the shore. This stretch of the basin, however, is heavily contaminated with lead and other metals—a legacy of mining and smelting operations conducted with scant attention to the consequences for human and environmental health. Although the parking lot at Killarney Lake has been paved to cap the contaminated material underneath and clean topsoil has been spread to help establish a grassy swale between the parking lot and the lake, no further cleanup has been undertaken at the site. The surrounding soils and the lake sediments continue to harbor high levels of lead and other metals. These contaminants continue to pose a risk to the health of humans and wildlife that use the site. So health and environmental agencies have posted a large sign urging people to take steps to protect themselves.¹ The sign notes that small children and pregnant women are at particular risk from exposure.² The sign directs people to wash their hands, faces, toys, and pacifiers if these have been in contact with the soil or dust; to avoid picnicking on the ground; to remove soil from clothing, camping equipment, and pets before leaving the area; and to ensure that their children: “PLAY CLEAN! Children should play in grassy areas and avoid loose soil, dust, and muddy areas. *No mud pies.*”³

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1. NAT'L ACADS., BUNKER HILL MINING AND METALLURGICAL COMPLEX OPERABLE UNIT 3: NAS REVIEW COMMITTEE TOUR (2004), available at [http://yosemite.epa.gov/R10/CLEANUP.NSF/fb6a4e3291f5d28388256d140051048b/a2887c971c1dd0f588256cce00070aac/\\$FILE/NAS%20Review%20Committee%20Tour%20041404.pdf](http://yosemite.epa.gov/R10/CLEANUP.NSF/fb6a4e3291f5d28388256d140051048b/a2887c971c1dd0f588256cce00070aac/$FILE/NAS%20Review%20Committee%20Tour%20041404.pdf) (depicting the sign at the Killarney Lake Recreation Site and noting that it is “a popular recreation site for camping and various day uses, including fishing, boat launching and picnics”).

2. *Id.*; accord Telephone Interview with Jerry Cobb, Panhandle Health District, Idaho (June 27, 2005).

3. *Id.* (emphasis added).

The government decision makers charged with cleaning up the Coeur d'Alene River Basin have opted for a form of risk avoidance—a regulatory approach that addresses environmental risks by asking those whose practices or lifeways expose them to contaminants to alter their ways in order to avoid exposure. Other examples of risk avoidance measures include fish and wildlife consumption advisories; use-restricted cleanups and institutional controls; ozone alerts; pesticide and herbicide contact warnings; beach advisories and closures; and boil-water notices. Risk avoidance stands in contrast to risk reduction, which addresses environmental risks by requiring contaminants to be prevented, reduced, or cleaned up at the source. Risk avoidance leaves contamination unabated, in whole or in part. It places responsibility on those exposed to avoid the fish, water, soils, or air left polluted.

According to proponents, this shift from risk reduction to risk avoidance promises large cost savings. Although the magnitude of the potential savings is a matter of some dispute, it is likely that erecting a fence, posting a warning sign, or maintaining a website entails modest sums—whereas the price tag for prevention, reduction, or cleanup can run into the millions. Other advantages, too, might be cited in favor of risk avoidance.

But a move to risk avoidance introduces a raft of perils. Risk avoidance focuses only on the targeted human health risk. As such, it foregoes a web of ancillary benefits for human and ecological health, for current and future generations. Risk avoidance introduces risks: as people change their practices in accordance with warnings and advisories, they lose the nutritional, health, and other benefits of their former ways. Risk avoidance thwarts the flourishing of plural and diverse lifeways. Risk avoidance is an approach of diminishing and ultimately finite possibilities, as environments are permitted one by one to become and remain contaminated. Risk avoidance is unjust: it disproportionately burdens tribes and their members, people of color, and low-income people, and it may offer alternatives for avoidance that are unrealistic or impossible from their perspectives. And this is only if all goes well, that is, if agencies can remedy the serious problems with communicating, implementing, and enforcing in perpetuity the risk avoidance measure—if agencies can get the children at Killarney Lake to wash their hands, to eat only on the tables, and to stay out of the mud.

Ultimately, the question of whether risk avoidance is promising or perilous requires us to consider some very basic questions about the kind of world in which we wish to live. Do we wish to shape a world in which we must refrain from eating the fish, drinking the water, playing at the field

down the hill, working outdoors, and undertaking a host of other heretofore ordinary, healthful, and even cherished human activities? Do we wish to ask our children to stop making mud pies?

In fact, we as a society *have* reflected upon these basic questions. Our collective commitment to risk reduction is embodied in a host of environmental statutes and other laws. In these laws, we have agreed to seek to prevent, reduce, and eliminate contamination and its consequent risks. Risk avoidance, then, amounts to a radical departure from these commitments—and, in many instances, a veritable rewriting of the applicable laws.

Yet for the most part, the rise of risk avoidance has not been accompanied by any effort to consider and justify such a move. Indeed, risk avoidance approaches have only recently been recognized as such. This is partly because the shift to risk avoidance often occurs quietly and incrementally. Measures such as fish consumption advisories that are intended to provide temporary warning until contamination could be abated have been allowed to remain in place for years. To this end, the Environmental Protection Agency (EPA) under the current administration has been a particular force, sidestepping statutory risk reduction requirements and enlisting risk avoidance in their stead.

This slouch toward avoidance is troubling, among other things, because risk avoidance becomes an approach adopted by default. Statutory mandates wither, discretionary “programs” replace regulation, and interim warning measures become permanent—but no one ever has the opportunity expressly to debate whether this departure from current commitments is an appropriate regulatory course. Such debate, of course, may properly belong in legislative fora. Because risk avoidance in many instances charts a departure from current statutory duties and deadlines, it will often require legislative authorization. In any event, to the extent that legislatures or, where legally permissible, agencies contemplate this route, they are urged to take account of risk avoidance’s numerous and serious perils. Unless proponents of risk avoidance can provide a satisfactory response to these concerns, legislatures ought not depart from—and courts ought to see that agencies uphold—current commitments to risk reduction.

Part I of this Article describes the rise of risk avoidance as a regulatory tool. It distinguishes risk avoidance approaches from risk reduction strategies, and it provides several examples of risk avoidance, focusing on fish and wildlife consumption advisories; use-restricted cleanups and institutional controls; and ozone alerts. It then highlights the fact that risk avoidance measures shift the regulatory focus from the sources of pollution to its human receptors and discusses some of the consequences of this

focus.

Part II of this Article explores the promise and the perils of risk avoidance. This Part canvasses the arguments for and against increased reliance on risk avoidance in lieu of risk reduction. It concludes that, on balance, risk avoidance will be inappropriate in most instances. It closes by recognizing that risk avoidance may nonetheless seem appealing and that decision makers will be called upon to evaluate the competing claims in particular instances.

Part III of this Article discusses the process for evaluating risk avoidance. It observes that we need a mode of analysis that reveals what is at stake and for whom. It argues that cost-benefit analysis—a decisional tool with ambitions to become the dominant mode of analysis in risk regulation—is ill suited to the task. Finally, it ventures several prescriptions for evaluation, undertaken as part of a debate that is reframed to consider whether a given risk, with its attendant possibilities for avoidance, is morally, culturally, and socially acceptable.

I. THE RISE OF RISK AVOIDANCE

Government decision makers have increasingly come to rely on risk avoidance as a form of risk regulation. Risk avoidance has been enlisted in numerous contexts, supplanting risk reduction in whole or in part. This Part describes the rise of risk avoidance, as well as the features that set this approach apart from standard regulatory efforts to prevent, limit, or clean up environmental contamination.

A. Risk Avoidance

Environmental contaminants continue to pollute the air, water, soil, and sediments. Once released into the environment, they behave in various ways. Many of these contaminants remain present and available in amounts toxic to humans and other living things. The resulting threat to human health (and, in some instances, ecological health) is the subject of environmental risk regulation. Risk here is the product of the toxicity of a particular contaminant and the duration and frequency of human exposure to that contaminant. Human exposure occurs via numerous pathways: we inhale contaminants in the air we breathe; we absorb through our skin contaminants in the soil with which we work and play; and we ingest contaminants that have bioaccumulated in the fish we eat.

Risk regulation in the environmental context has focused, until recently, on *risk reduction*. Under this approach, risks are reduced by

targeting the first link in the chain that connects environmental contamination to adverse health effects for humans and the environment. Such regulatory efforts seek to eliminate the *sources* of risks, i.e., environmental contaminants. Risk reduction strategies thus look to risk-producers and require them to prevent, limit, or clean up environmental contamination. These risk-producers might be compelled, for example, to clean up mercury in the sediments of Onondaga Lake, given that methylmercury bioaccumulates in fish and is a source of exposure to humans and other wildlife.⁴ Or risk-producers might be permitted to emit only very limited quantities of ozone precursors to the air in the Los Angeles basin, given the perennially poor air quality in the region.⁵ What risk reduction strategies have in common is that they allocate the responsibility for addressing risks to those who produce environmental contamination.

Increasingly, however, government decision makers are relying on *risk avoidance*. Under this approach, risks are addressed by intervening late in the chain, breaking the link at the point of human exposure. Risk avoidance strategies leave contamination unabated. Instead, they target the human “receptors.” That is, they look to those whose practices or lifeways expose them to contamination and require these individuals to take steps to alter their ways, thereby “avoiding” the risk. For example, these risk-bearers might be asked to move from their homes or homelands to avoid contact with soils contaminated with lead. They might be advised to stay indoors on “ozone alert” days to avoid breathing poor quality air, particularly if they are asthmatic, elderly, or otherwise sensitive to air pollution. They might be admonished to refrain from breastfeeding or to cease consuming fish to avoid exposing their infant children to polychlorinated biphenyls (PCBs) or other bioaccumulative contaminants in nearby waters. They might be warned to alter traditional tending, gathering, and weaving practices to avoid absorbing or ingesting pesticides applied to areas in which basketry materials grow. What risk avoidance strategies have in common is that they allocate the responsibility for addressing risks to those who bear the risks of exposure to environmental contamination.

4. N.Y. STATE DEP'T OF ENVTL. CONSERVATION & REGION 2, U.S. ENVTL. PROT. AGENCY, RECORD OF DECISION, ONONDAGA LAKE BOTTOM SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE (2005), available at <http://www.dec.state.ny.us/website/der/projects/ondlake/onondagalakerod.pdf>.

5. See, e.g., AM. LUNG ASS'N, STATE OF THE AIR: 2004 (2004), available at http://www.californialung.org/downloads/sota04_ca.pdf (finding that the Los Angeles, Long Beach, and Riverside area “remains the most ozone-polluted city in the nation,” as it has been for some years).

B. Examples of Risk Avoidance as Risk Regulation

Government decision makers have employed risk avoidance in several regulatory contexts. This section focuses on three contexts in which risk avoidance has become a fixture: fish and wildlife consumption advisories; use-restricted cleanups and institutional controls; and ozone alerts.

1. Fish and Wildlife Consumption Advisories

A litany of toxic substances has been, and continues to be, released into the environment, thereby contaminating aquatic ecosystems.⁶ Many of these contaminants are persistent and bioaccumulative, existing in increasing concentrations in organisms higher up the “food chain.” Humans who consume fish and wildlife that are part of this food chain are exposed to these contaminants. Indeed, fish consumption is the single greatest source of human exposure to mercury⁷ and PCBs.⁸ Fish consumption is also a significant source of exposure to chlordane, dioxins, DDT, and numerous other contaminants.⁹

Fish consumption advisories are directed to people who would consume fish from contaminated waters, particularly those subpopulations likely to suffer adverse effects given the contaminants at issue. Advisories typically provide information about the nature and extent of the contamination (e.g., indicating the water bodies affected and the fish species implicated) and its adverse health effects (e.g., noting whether the contaminants of concern are carcinogens, neurodevelopmental toxins, etc.).

6. See, e.g., REGION 10, U.S. ENVTL. PROT. AGENCY, COLUMBIA RIVER BASIN FISH CONTAMINANTS SURVEY 1996–1998 (n.d.), available at [http://yosemite.epa.gov/r10/oea.nsf/0703bc6b0c5525b088256bdc0076fc44/c3a9164ed269353788256c09005d36b7/\\$FILE/Fish%20Study.PDF](http://yosemite.epa.gov/r10/oea.nsf/0703bc6b0c5525b088256bdc0076fc44/c3a9164ed269353788256c09005d36b7/$FILE/Fish%20Study.PDF) (detecting ninety-two contaminants in Columbia River Basin fish); OFFICE OF ENVTL. HEALTH ASSESSMENTS, WASH. STATE DEP’T OF HEALTH, EVALUATION OF CONTAMINANTS IN FISH FROM LAKE WASHINGTON, KING COUNTY, WASHINGTON (2004), available at http://www.doh.wa.gov/ehp/oehas/publications_pdf/lake_wa_contaminants_in_fish_King-09-2004.pdf (finding DDTs, PCBs, and mercury in Lake Washington fish).

7. OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, MERCURY UPDATE: IMPACT ON FISH ADVISORIES 3 (2001), available at <http://www.epa.gov/ost/fishadvice/mercupd.pdf> [hereinafter EPA, MERCURY UPDATE] (“Fish and other seafood products are the main source of methylmercury in the diet . . .”).

8. See OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, FACT SHEET: POLYCHLORINATED BIPHENYLS (PCBs) UPDATE: IMPACT ON FISH ADVISORIES 2 (1999), available at <http://www.epa.gov/waterscience/fish/pcbs.pdf> [hereinafter EPA, PCBs UPDATE] (reporting that fish are the main dietary source of PCBs).

9. See OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY: 2004 NATIONAL LISTING OF FISH ADVISORIES 4–5 (2005), available at <http://www.epa.gov/waterscience/fish/advisories/fs2004.pdf> [hereinafter EPA, FISH CONSUMPTION ADVISORIES] (reporting fish advisory numbers for mercury, PCBs, chlordane, dioxins, DDT, and other contaminants).

Advisories then recommend avoidance by one or more of several means (e.g., refraining altogether from eating a particular species; reducing the amount of fish over a certain size or age that is consumed; substituting alternate fishing sites; or altering preparation methods).

Fish and wildlife consumption advisories currently blanket the waters of the United States. According to the most recent tally, 35% of the lake acreage and 24% of the river miles in the United States were under advisory in 2004 for one or more pollutants.¹⁰ This represents a total of 14,285,062 lake acres and 839,441 river miles.¹¹ In addition, the entirety of the Great Lakes and their connecting waters were under advisory in 2004, as were roughly 65% of coastal waters.¹² The geographic reach of fish consumption advisories, moreover, has expanded continuously since the EPA began providing such data in 1993.¹³

Although agencies continue to characterize advisories as regrettable or temporary responses to contamination, they now occupy an important, and seemingly permanent, place on agencies' risk management rosters. EPA, for example, has maintained that fish consumption advisories are a temporary means to address human health risks while risk reduction is pursued with vigor, claiming that "[n]o one wants consumption advisories in place any longer than necessary."¹⁴ Yet agencies' deeds often belie such claims. Advisories have been in effect in some places since the 1970s.¹⁵ And in 2001, the EPA joined the Food and Drug Administration (FDA) in issuing the first national fish consumption advisory (due to mercury

10. EPA, FISH CONSUMPTION ADVISORIES, *supra* note 9, at 2. These numbers exclude the Great Lakes and their connecting waters. *Id.* at 3.

11. *Id.* at 2.

12. *Id.* at 3. The figure for coastal waters excludes Alaska because it has no advisories. *Id.*

13. *Id.* at 2. Note that improved assessment on the part of agencies and continued vigilance by affected people provide a partial explanation for the increase in advisories' number and coverage. In recent years, agencies have gathered data on a larger sample of fish tissue from a larger sample of water bodies, finding levels of contamination warranting advisories in a greater number of instances. Nonetheless, a shift in agencies' acceptance of risk avoidance strategies likely also helps to explain the increase. Catherine A. O'Neill, *Risk Avoidance, Cultural Discrimination, and Environmental Justice for Indigenous Peoples*, 30 *ECOLOGY L.Q.* 1, 10 (2003) [hereinafter O'Neill, *Risk Avoidance and Indigenous Peoples*].

14. Elizabeth Southerland of the EPA's Office of Water opened the 2001 National Forum on Contaminants in Fish with this declaration. ELIZABETH SOUTHERLAND, PROCEEDINGS OF THE NATIONAL FORUM OF CONTAMINANTS IN FISH, MAY 6 & 9, 2001, 1-10 (2001), available at <http://www.epa.gov/ost/fish/forum/fishforum.pdf>. See generally O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 10 (discussing agencies' increasing embrace of fish consumption advisories, in deed if not in word).

15. OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, GUIDANCE FOR ASSESSING CHEMICAL CONTAMINANT DATA FOR USE IN FISH ADVISORIES, VOLUME IV: RISK COMMUNICATION 1 (1995) [hereinafter EPA, RISK COMMUNICATION GUIDANCE].

contamination).¹⁶ But four years later, EPA declined to issue a rule governing mercury emissions from coal-fired utilities that required meaningful risk reduction, preferring instead to refer those exposed to fish consumption advisories.

In fact, this rule, the Clean Air Mercury Rule (CAMR), is illustrative of agency reliance on risk avoidance in the form of fish consumption advisories.¹⁷ The CAMR was widely expected to require a 90% reduction in mercury emissions from coal-fired utilities—from approximately forty-eight tons per year to five tons per year. This reduction was to be achieved within three years, i.e., by 2007, consistent with the Clean Air Act's (CAA) provisions for air toxics under section 112.¹⁸ As such, it would have required significant reductions from the largest remaining unregulated source of mercury, a toxic air pollutant with neurodevelopmental and other adverse effects on human health.¹⁹ Instead, in May 2005, EPA issued a rule that requires only a 50% reduction in mercury emissions, and not until 2020 at the earliest.²⁰ To do so, EPA undertook a novel—and legally questionable—interpretation of the CAA that substitutes a cap-and-trade approach for the two-tiered strategy set forth in section 112, which couples initial technology-based requirements with a residual risk-based approach.²¹ In fact, as a consequence of emissions trading, EPA's rule is likely to permit localized instances of *increased* contamination.²² Given that its rule

16. U.S. ENVTL. PROT. AGENCY, WHAT YOU NEED TO KNOW ABOUT MERCURY IN FISH AND SHELLFISH: 2004 EPA AND FDA ADVICE FOR WOMEN WHO MIGHT BECOME PREGNANT, WOMEN WHO ARE PREGNANT, NURSING MOTHERS, AND YOUNG CHILDREN, *available at* <http://www.epa.gov/ost/fishadvice/advice.html> (last visited Oct. 16, 2006) [hereinafter EPA, MERCURY ADVISORY FOR WOMEN AND CHILDREN].

17. Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. 28,606, 28,642 (May 18, 2005) (to be codified at 40 C.F.R. pts. 60, 72, 75) (finalizing the Clean Air Mercury Rule). *See generally* Catherine A. O'Neill, *Mercury, Risk, and Justice*, 34 *Envtl. L. Rep. (Envtl. Law Inst.)* 11,070, 11,106 (Dec. 2004) [hereinafter O'Neill, *Mercury, Risk, and Justice*] (documenting the fact that EPA's Clean Air Mercury Rule leaves many in the United States inadequately protected, instructing those most exposed to undertake risk avoidance).

18. O'Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,081 (citation omitted).

19. NAT'L RES. COUNCIL, TOXICOLOGICAL EFFECTS OF METHYLMERCURY 175–81 (2000).

20. Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. at 28,619.

21. *See* Lisa Heinzerling & Rena I. Steinzor, *A Perfect Storm: Mercury and the Bush Administration*, 34 *Envtl. L. Rep. (Envtl. Law Inst.)* 10,297, 10,297–98, 10,305 (April 2004) [hereinafter Heinzerling & Steinzor, *Perfect Storm I*] (chronicling mercury regulation under the Bush Administration, focusing on scientific and legal issues); Lisa Heinzerling & Rena I. Steinzor, *A Perfect Storm: Mercury and the Bush Administration, Part II*, 34 *Envtl. L. Rep. (Envtl. Law Inst.)* 10,485, 10,486–87 (June 2004) [hereinafter Heinzerling & Steinzor, *Perfect Storm II*] (chronicling mercury regulation under the Bush Administration, focusing on economic and fairness issues).

22. O'Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,098 (“[H]ot spots exist where trading perpetuates or exacerbates localized instances of relatively high mercury deposition, [methylmercury] bioavailability or [methylmercury] exposure.”).

does little to reduce mercury emissions and may even increase mercury emissions in some areas, EPA recognized that the CAMR fails to reduce the risks of mercury contamination to many of those exposed.²³ So EPA instructs those affected, particularly children and women of childbearing age, to consult fish consumption advisories and reduce or eliminate fish from their diets accordingly.²⁴ Thus, rather than seek fully to reduce the risks to those who regularly consume fish by decreasing the amount of mercury emitted into the environment, the rule shifts responsibility to these people to avoid the risk by altering their fish consumption practices. The burden of undertaking avoidance here falls on all those who consume fish in greater amounts or who consume different species from different waters than “the typical U.S. consumer”²⁵ assumed by the EPA—among them Native Americans, Southeast Asian Americans, and low-income subsistence fishers.²⁶

In a similar vein, EPA has to date declined to disapprove Oregon’s water quality standards, which employ a fish consumption rate that seriously underprotects those who regularly consume fish, particularly members of Oregon’s various fishing tribes.²⁷ In May 2004, the Oregon Environmental Quality Commission adopted revisions to Oregon’s water quality standards, pursuant to section 303 of the Clean Water Act (CWA).²⁸ These water quality standards form the basis of numerous regulatory decisions. Among other things, water quality standards drive the concentration of pollutants permitted to be discharged by sources under the

23. *Id.* at 11,106–07.

24. See Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. at 28,642.

In response to potential risks of consuming fish containing elevated concentrations of [mercury], EPA and the [FDA] have issued a joint fish consumption advisory which provides recommended limits on consumption of certain fish species This joint EPA and FDA advisory recommends that women who may become pregnant, pregnant women, nursing mothers, and young children to (sic) avoid some types of fish . . . and [check] any local advisories that may exist for local rivers and streams.

Id.

25. Proposed National Emissions Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam-Generating Units; Proposed Rule, 69 Fed. Reg. 4,652, 4,658 (proposed Jan. 30, 2004) (to be codified at 40 C.F.R. pts. 60, 63). This “typical U.S. consumer,” EPA assures, “is not in danger of consuming harmful levels of methylmercury from fish and is not advised to limit fish consumption.” *Id.*

26. *Id.* at 4,709.

27. E-mail from Adrienne Allen, U.S. Env’tl. Prot. Agency, to Catherine O’Neill, author (Dec. 8, 2006).

28. Or. Admin. R. 340-041-0033 (2000); Federal Water Pollution Control Act, 33 U.S.C. § 1313(c) (2000).

National Pollutant Discharge Elimination System (NPDES).²⁹ Water quality standards serve as “applicable or relevant and appropriate requirements” (ARARs) for federal- or state-led cleanups.³⁰ Water quality standards also determine whether waters are “impaired” within the meaning of the CWA section 303(d) process.³¹ The EPA recently issued a revised methodology governing the process by which states and tribes set water quality standards.³² Important among the changes ushered in by the revised methodology is EPA’s move away from a single, national default value for the fish consumption rate to be employed in developing water quality standards meant to protect human health. Rather, “EPA strongly emphasizes that States . . . should consider developing criteria to protect highly exposed population groups and use local or regional data . . . as more representative of their target population group(s).”³³ EPA therefore instated a four-part hierarchy, preferring, in order: (1) the use of local data; (2) the use of data reflecting consumption by groups similar in terms of geography and population; (3) the use of selected data from national surveys; and (4) the use of national default intake rates supplied by EPA.³⁴ At the time of its decision, Oregon had in hand quantitative surveys and other data of the first sort, including a survey conducted by the Columbia River Inter-Tribal Fish Commission and sponsored in part by the EPA.³⁵ Notably, these local data documented fish consumption for the Columbia River Basin tribes at several times the rate of the general population described by the EPA default values.³⁶ Despite this documentation, Oregon employed the EPA default fish consumption rate for the general population of 17.5

29. 33 U.S.C. § 1342 (2000).

30. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9621(d) (2000).

31. 33 U.S.C. § 1313(d) (2000).

32. See OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, METHODOLOGY FOR DERIVING AMBIENT WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH 1-1 (2000), available at <http://www.epa.gov/waterscience/humanhealth/method/complete.pdf> [hereinafter EPA, AWQC METHODOLOGY] (“These 304(a) criteria may be used as guidance by States and authorized Tribes to establish water quality standards, which ultimately provide a basis for controlling discharges or releases of pollutants into ambient waters.”).

33. *Id.* at 4-24, 4-25.

34. *Id.* at 4-25.

35. COLUMBIA RIVER INTER-TRIBAL FISH COMM’N, TECHNICAL REPORT 94-3, A FISH CONSUMPTION SURVEY OF THE UMATILLA, NEZ PERCE, YAKAMA, AND WARM SPRINGS TRIBES OF THE COLUMBIA RIVER BASIN (1994) [hereinafter CRIFTC]; see also Stuart G. Harris & Barbara L. Harper, *A Native American Exposure Scenario*, 17 RISK ANALYSIS 789, 790 (1997) (describing the potential exposure to traditional Columbia River Basin tribal members for subsistence activities and quantifying fish consumption for this population).

36. See CRIFTC, *supra* note 35 (revealing a mean consumption rate of 63.2 grams/day, a 99th percentile rate of 389 grams/day, and a maximum rate of 972 grams/day). See Harris & Harper, *supra* note 35, at 791 (documenting an average consumption at 540 grams/day).

grams/day.³⁷ Moreover, Oregon did so in the face of this and other evidence brought to its attention by the Confederated Tribes of the Umatilla Indian Reservation and against the advice of the Oregon Department of Environmental Quality's (ODEQ) own Technical Advisory Committee.³⁸ Under the Clean Water Act, EPA must approve or disapprove a state's water quality standards.³⁹ Although Oregon's standards invoked the least-preferred option,⁴⁰ and may well run afoul of the tribes' treaty rights and a host of other legal obligations,⁴¹ EPA has so far declined to disapprove them. EPA has, thereby, let stand water quality standards in Oregon that will fail to reduce the risks of contamination to all those who consume fish at rates greater than the national default, that is, all those who eat more than roughly one fish meal every two weeks. Thus, EPA leaves it to these individuals to take steps to protect themselves by decreasing their fish consumption to the levels assumed by Oregon's standards, or else face the risks from a host of toxic contaminants, including carcinogens such as dioxins and PCBs.

2. Use-Restricted Cleanups and Institutional Controls

Toxic substances released in the past have left a legacy of contaminated surface water, sediments, groundwater, and soils at hundreds

37. Martin S. Fitzpatrick, *Toxic Compounds Criteria 1999–2003 Water Quality Standards Review: Issue Paper H-76 (2004)*, available at <http://www.deq.state.or.us/wq/standards/ToxicsEQCDocs/AttachmentHToxicsCriteriaIssuePaperfinal.pdf>.

38. The efforts of the Confederated Tribes of the Umatilla Indian Reservation and the advice of the ODEQ's Technical Advisory Committee are described in the administrative complaint filed with EPA under its regulations implementing Title VI of the Civil Rights Act of 1964, by which CTUIR alleged that ODEQ used federal funds to implement regulations having a discriminatory effect on the basis of race, color, and/or national origin. See *Confederated Tribes of the Umatilla Indian Reservation, Title VI Administrative Complaint* (June 9, 2005) (on file with the author) [hereinafter CTUIR]; see also FITZPATRICK, *supra* note 37, at H-36 (noting that the Technical Advisory Committee had formally recommended a three-tiered system, whereby Oregon's waters would be divided according to "fishing intensity," with criteria for "low intensity" waters to be set using a 17.5 grams/day fish consumption rate, for "medium intensity" waters to be set using a 142.4 grams/day fish consumption rate, and for "high intensity" waters, including waters fished by tribal fishers, to be set using a 389 grams/day fish consumption rate).

39. Federal Water Pollution Control Act, 33 U.S.C. § 1313(c)(3) (2000); U.S. Envtl. Prot. Agency Water Programs, 40 C.F.R. § 131.6 (2005).

40. Indeed, ODEQ opted for the very least protective among even EPA's default values, eschewing EPA's default value for "subsistence fishers," which is 142.4 grams/day, in favor of the default value for the "general population," at 17.5 grams/day. EPA, *AWQC METHODOLOGY*, *supra* note 32, at 4-26.

41. See, e.g., CTUIR, *supra* note 38; Catherine A. O'Neill, *Protecting the Tribal Harvest: The Right to Catch and Consume Fish*, Presentation at the 2006 EPA-Tribal Leaders Summit (Aug. 23, 2006) (transcript on file with the CTUIR) [hereinafter O'Neill, *Protecting the Tribal Harvest*].

of sites around the United States. These substances or their chemical successors behave in various ways in the environment, lingering or migrating, biodegrading or bioaccumulating. Ultimately, humans living within or near contaminated sites may be exposed to contaminants via a variety of pathways. For example, they might ingest groundwater contaminated with trichloroethylene (TCE); they might ingest sediments, soil, and dust laced with lead; or they might ingest mother's milk laden with PCBs.

For over two decades, environmental agencies have worked under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)⁴² and other statutes to clean up and restore contaminated sites. Although the cleanup process has been understood from the outset to raise complex questions of degree, agencies have nonetheless been guided by a focus on risk reduction. Thus, they have aimed permanently to clean up contamination to a level sufficient to protect the health of humans who might in the future live at and use the resources of the site.⁴³ In fact, CERCLA includes an explicit preference for long-term, permanent treatment, as opposed to temporary measures or mere containment of the contaminants at a site.⁴⁴

Since the mid-1990s, however, agencies have increasingly fashioned "use-restricted" cleanups, altering the cleanup baseline to allow some amount of contamination to remain at the site, undiminished in quantity or toxicity, while looking to institutional controls to restrict future uses of the site. Institutional controls refer to an array of legal, administrative, or institutional devices that urge or require people to limit their contact with the contaminants left in place.⁴⁵ Such devices take the form of fences, warning signs, zoning measures, easements, restrictive covenants, reversionary interests, and prohibitions or restrictions on resource use.⁴⁶ Institutional controls function within a paradigm of use-restricted cleanups, whereby the future uses of a portion or the entirety of a site are limited to

42. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601-75 (2000).

43. See National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. § 300.430(e)(9)(iii)(A) (2005) (describing one of nine criteria for evaluating alternatives for the "overall protection of human health and the environment").

44. See CERCLA § 9621(b)(1) (preferring options that "permanently and significantly reduce[] the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants").

45. See U.S. ENVTL. PROT. AGENCY, STRATEGY TO ENSURE INSTITUTIONAL CONTROL IMPLEMENTATION AT SUPERFUND SITES 2 (2004), available at <http://www.epa.gov/superfund/action/ic/icstrategy.pdf> (defining institutional controls as "non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contaminations and protect the integrity of the remedy").

46. *Id.*

those uses that will result in little or no human contact with the contaminants left in place.⁴⁷ So long as the uses are adequately circumscribed and the institutional controls appropriately maintained, humans can avoid being exposed to the contaminants that remain.

Use-restricted cleanups and the institutional controls on which they rely have proliferated in recent years. Institutional controls are often important components—sometimes the sole component—of hundreds of remedial efforts. Many state agencies and legislatures have hastened to embrace institutional controls in the context of use-restricted cleanups, particularly in the brownfields context.⁴⁸ For example, whereas prior to 1994 Connecticut required that contaminated sites under its cleanup program be restored to a “pristine” state, legislative changes now permit the Connecticut Department of Environmental Protection to employ “differentiated” or “flexible” cleanup standards based on the proposed future uses of a site.⁴⁹

At the federal level, too, institutional controls have come to play an increasingly central role in cleanup efforts. Once viewed as interim measures meant to limit human exposure until cleanup at a site could be completed, agencies now rely on institutional controls in the long term, as a partial or total substitute for cleanup.⁵⁰ According to the National

47. See Alex Geisinger, *Rethinking Risk-Based Environmental Cleanup*, 76 IND. L.J. 367, 368–69 (2001) (“[U]se-restricted cleanup pairs reduced removal or detoxification of materials at a contaminated site with a limitation of use ensuring that the site will not be used in ways that will expose people to the remaining contaminants.”); Heidi Gorovitz Robertson, *Legislative Innovation in State Brownfields Redevelopment Programs*, 16 J. ENVTL. L. & LITIG. 1, 8 (2001) (explaining that use-restricted cleanup involves leaving some contaminants on-site while restricting the use of the land to minimize health risks). Use-restricted cleanup approaches may also be referred to as “risk-based,” “differentiated,” or “flexible,” cleanups or referred to as “long-term stewardship” programs.

48. See, e.g., Geisinger, *supra* note 47, at 374–76 (noting the high cost of cleaning up brownfields and discussing potential governmental responses); see also Gorovitz Robinson, *supra* note 47, at 10–15 (giving examples of various state agencies’ responses to brownfields cleanup); John Pendergrass, *Sustainable Redevelopment of Brownfields: Using Institutional Controls to Protect Public Health*, 29 *Envtl. L. Rep. (Envtl. Law Inst.)* 10,243, 10,243 (May 1999) [hereinafter Pendergrass, *Redevelopment of Brownfields*] (discussing mechanisms for blocking the pathways of exposure at brownfield sites); Bradford C. Mank, *Reforming State Brownfield Programs to Comply with Title VI*, 24 *HARV. ENVTL. L. REV.* 115, 134–35 (2000) (noting that most states have statutes or regulations that authorize agencies to consider future uses). To the extent that state legislatures have approved this shift to risk avoidance following public debate, the shift in this context represents the exception to the rule that the rise of risk avoidance has generally been unaccompanied by considered deliberation. Note that such debate has not occurred in Congress, although use-restricted cleanups and institutional controls have been embraced on the initiative of the relevant agency, EPA.

49. Gorovitz Robinson, *supra* note 47, at 12–13 (citation omitted).

50. Geisinger, *supra* note 47, at 371–76 (describing EPA’s increased reliance on institutional controls to supplement or supplant engineering controls and noting a paradigm shift among agencies in general: “Rather than emphasizing removal or decontamination, regulators now consider whether exposure can be limited.”); Gorovitz Robinson, *supra* note 47, at 15 (“Although institutional controls

Contingency Plan, EPA now expects to use institutional controls for both short- and long-term management.⁵¹ And EPA now commonly gauges the extent of remediation it will require at a site to predictions of likely future land uses.⁵² This enthusiasm for use-restricted cleanups and institutional controls, moreover, appears likely to continue undampened in the future; this is especially so in the brownfields context.⁵³

Use restrictions and institutional controls guided cleanup, for example, at the Agriculture Street Landfill (ASL) site in New Orleans, Louisiana. For over half a century, until the late 1960s, the city of New Orleans used the ninety-five acre site as a dump for everything from municipal waste to the debris from Hurricane Betsy in 1965.⁵⁴ Shortly after the landfill was closed and covered over with a layer of sand, federal and local governments supported the redevelopment of the property, locating residential subdivisions, several small businesses, and the Moton Elementary School on a portion of the site while leaving undeveloped another portion of the site.⁵⁵ In 1994, after tests revealed a host of contaminants at depths ranging from two to more than thirty-two feet underground, EPA placed the site on the National Priorities List (NPL) and began cleanup under CERCLA.⁵⁶ EPA's cleanup plan called for replacing the top two feet of exposed soils in the "developed" area and for leaving the contamination in place in the entire forty-eight acre "undeveloped" portion of the site, covering the contaminated soils there with one foot of clean fill, a geotextile mat, and fencing the area.⁵⁷ Cleanup according to this plan was undertaken in the

once were merely an interim measure used to protect people from exposure until a site cleanup was complete, these controls are now used to provide long term protection from exposure, when total site remediation is not contemplated.").

51. Geisinger, *supra* note 47, at 371.

52. See, e.g., OFFICE OF SOLID WASTE & EMERGENCY RESPONSE, U.S. ENVTL. PROT. AGENCY, DIRECTIVE NO. 9355.7-04, LAND USE IN CERCLA REMEDY SELECTION PROCESS 2, available at http://www.epa.gov/fedfac/documents/land_use_cercla_remedy.htm (last visited Nov. 2, 2006) (directing EPA regional offices to determine the appropriate extent of remediation according to the predicted future land uses of a site). For a summary of EPA's Directive No. 9355.7-04, see 60 Fed. Reg. 29,595 (June 5, 1995).

53. See, e.g., Charles Bartsch, *Redeveloping Brownfields: Evaluating the Program and Looking to the Future*, 37 BNA ENV'T. REP. 206 (Jan. 27, 2006) (asserting that state and local governments are continually encouraging brownfield reuse through economic incentives and other "institutional controls").

54. U.S. ENVTL. PROT. AGENCY, SUPERFUND RECORD OF DECISION: AGRICULTURE STREET LANDFILL 1 (2002), available at <http://www.epa.gov/superfund/sites/rods/fulltext/r0602008.pdf> [hereinafter EPA, ASL ROD].

55. *Id.*

56. REGION 6, U.S. ENVTL. PROT. AGENCY, AGRICULTURE STREET LANDFILL 1-2 (2006), available at <http://www.epa.gov/earth1r6/6sf/pdffiles/0600646.pdf> [hereinafter REGION 6, EPA, ASL].

57. EPA, ASL ROD, *supra* note 54, at 4.

late 1990s and deemed complete in 2002.⁵⁸ According to the most recent Public Health Consultation conducted by the Agency for Toxic Substances Disease Registry (ATSDR), the undeveloped area of the site continued to warrant classification as a “public health hazard,” given the unacceptably high levels of lead, arsenic, and polycyclic aromatic hydrocarbons (PAHs) present in the soil.⁵⁹ The cap and the fence around the undeveloped area were intended to ensure that humans, including over 1000 people living on site in the adjacent residential areas, avoided the risks of exposure to these toxic substances.⁶⁰ There is evidence, however, that people remained at risk, both from direct contact with contaminants remaining in the undeveloped area and from the possibility that the toxic substances left in place would contaminate (or recontaminate) surrounding areas. The ATSDR noted that “[a]lthough entry to this area has been limited by a fence, individuals continue to access this area and may come in contact with the elevated levels of lead and arsenic in the soil.”⁶¹ Additionally, “cars, trucks, trailers and Mardi Gras parade floats” continued to be stored in the fenced-in area.⁶² A site inspection conducted as part of a CERCLA-mandated five-year review revealed that the soil had been disturbed in this area, sometimes to a depth of six inches.⁶³ Then, in September of 2005, Hurricane Katrina flooded New Orleans, potentially carrying lead, asbestos, and other contaminants to surrounding areas.⁶⁴

58. *Id.* at vii–viii.

59. AGENCY FOR TOXIC SUBSTANCES DISEASE REGISTRY, CTR. FOR DISEASE CONTROL & PREVENTION, HEALTH CONSULTATION: AGRICULTURE STREET LANDFILL, NEW ORLEANS, ORLEANS PARISH, LOUISIANA 1–2, *available at* http://www.atsdr.cdc.gov/HAC/PHA/agriculturest/agr_p1.html (last visited Oct. 6, 2006). In addition, ATSDR noted that while the majority of the residential area and the community center posed “no apparent public health hazard,” there are “scattered pockets” of lead, arsenic, and PAHs in the soil in these areas that would need to be addressed in order to prevent the possibility of human exposure to unacceptable levels of these contaminants. *Id.* at 2.

60. REGION 6, EPA, ASL, *supra* note 56, at 1 (noting that over 1,000 people live on site, housed in 179 Housing Authority of New Orleans town homes, 128 Gordon Plaza apartments, and sixty-seven single-family residences).

61. AGENCY FOR TOXIC SUBSTANCES DISEASE REGISTRY, *supra* note 59, at 1–2.

62. REGION 6, U.S. ENVTL. PROT. AGENCY, FIVE-YEAR REVIEW REPORT FOR AGRICULTURE STREET LANDFILL SUPERFUND SITE, NEW ORLEANS, ORLEANS PARISH, LOUISIANA 2 (2003), *available at* <http://www.epa.gov/superfund/sites/fiveyear/f03-06001.pdf> [hereinafter REGION 6, EPA, ASL FIVE-YEAR REVIEW]; accord Deon Roberts, *Residents Cry Foul After U.S. Superfund Cut*, NEW ORLEANS CITY BUS., Nov. 8, 2004 (observing that the practice of parking vehicles on this portion of the site continued, despite residents’ efforts to alert the New Orleans City Council).

63. REGION 6, EPA, ASL FIVE-YEAR REVIEW, *supra* note 62, at 2.

64. Juliet Eilperin, *Flooded Toxic Waste Sites Are Potential Health Threat*, WASH. POST, Sept. 10, 2005, at A15 (noting that environmental scientists at the time agreed that “it was likely the rush of water, much of which remains trapped inside New Orleans, had infiltrated the waste [site] and absorbed a range of the contaminants,” and quoting Richard T. DiGiulo, head of Duke University’s Superfund Basic Research Center, who explained that “when a toxic site is flooded, the contaminants could seep

Use restrictions and institutional controls also comprise an important part of the remedy selected for the Bunker Hill Mining and Metallurgical site in the Coeur d'Alene River Basin. The site covers a twenty-one square-mile area surrounding the old Bunker Hill Company lead and zinc smelting complex in Kellogg, Idaho as well as surrounding areas throughout the 1,500-square-mile "Coeur d'Alene River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas."⁶⁵ After a century of mining, milling, and smelting activities, the smelter closed in 1981, leaving a legacy of severe heavy metal contamination, including antimony, arsenic, cadmium, lead, manganese, mercury, and zinc.⁶⁶ EPA added the site to the NPL in 1983, and cleanup activities have been ongoing since.⁶⁷ The contaminant of greatest concern at the site is lead, given its serious and irreversible adverse effects on the cognitive and behavioral development of young children exposed to even small amounts of lead.⁶⁸ Children are exposed when they ingest lead present in soils, sediments, and dust, typically in the context of the ordinary hand-to-mouth contact characteristic of childhood behavior.⁶⁹ Cleanup at this massive site is complex, and an array of remedial actions has been and will be undertaken over several phases. Among the most urgent tasks was the need to address the exceedingly high levels of lead contamination in city parks, school playgrounds, and residential yards, as well as the consequent elevated blood lead levels in children throughout the community.⁷⁰ Beginning in 1989, contaminated soils from residential yards were removed and replaced with a barrier and clean fill; this process is ongoing.⁷¹ Following remediation,

into surface water and the surrounding soil"); *see generally* Brad Knickerbocker & Patrik Jonsson, *New Orleans' Toxic Tide*, CHRISTIAN SCI. MONITOR, Sept. 8, 2005, at A1 (discussing the various toxins in the floodwaters after Hurricane Katrina).

65. REGION 10, U.S. ENVTL. PROT. AGENCY, BUNKER HILL MINING AND METALLURGICAL: SITE DESCRIPTION (2006) [hereinafter REGION 10, EPA, BUNKER HILL SITE DESCRIPTION], available at <http://yosemite.epa.gov/r10/nplpad.nsf> (follow "A. National Site Sheets" hyperlink; then follow "Alphabetically" hyperlink; then follow "BUNKER HILL MINING & METALLURGICAL" hyperlink).

66. *Id.*; COMM. ON SUPERFUND SITE ASSESSMENT & REMEDIATION IN THE COEUR D'ALENE RIVER BASIN, NAT'L RES. COUNCIL, SUPERFUND AND MINING MEGASITES: LESSONS FROM THE COEUR D'ALENE RIVER BASIN 15, 41, 123 (2005) [hereinafter NAT'L RES. COUNCIL, SUPERFUND AND MINING MEGASITES].

67. REGION 10, EPA, BUNKER HILL SITE DESCRIPTION, *supra* note 65.

68. AGENCY FOR TOXIC SUBSTANCES DISEASE REGISTRY, DRAFT TOXICOLOGICAL PROFILE ON LEAD (1997). Lead is also classified by the EPA as a "probable human carcinogen." *Id.*

69. *See, e.g.*, NAT'L RES. COUNCIL, SUPERFUND AND MINING MEGASITES, *supra* note 66, at 162.

70. REGION 10, EPA, BUNKER HILL SITE DESCRIPTION, *supra* note 65; REGION 10, U.S. ENVTL. PROT. AGENCY, BUNKER HILL POPULATED AREAS FIRST FIVE YEAR REVIEW REPORT 9 (1999) [hereinafter REGION 10, EPA, BUNKER HILL FIRST FIVE YEAR REVIEW].

71. *Id.*

maintenance, and any re-remediation necessitated by recontamination (e.g., because of flooding, erosion, or redeposition of contaminated soils) becomes the responsibility of the property owner.⁷² The remedy provides for an “Institutional Controls Program,” among other things to enforce property owners’ obligations to this end and to track permits for digging, construction, and other activities that might affect the integrity of the remediated areas.⁷³ Throughout the site, warning signs are posted urging individuals to “Protect Your Health.”⁷⁴ Signs such as the one at Killarney Lake, described above, greet the people who use the beaches, picnic areas, and boat launches along the various lakes and rivers on the site.⁷⁵ In each instance, these signs direct people to curtail their activities and those of their children in a variety of ways designed to limit their contact with the lead and metals that remain in the soils and sediments.⁷⁶

3. Ozone Alerts

Pollutants that are the precursors to tropospheric (ground-level) ozone—oxides of nitrogen and volatile organic compounds—continue to be emitted to the air, compromising air quality in a number of urban areas throughout the United States. Humans are exposed to ground-level ozone when they inhale the ambient air. Exposure to ground-level ozone has been linked to reduced lung function, increased frequency of adverse respiratory symptoms, and the development of asthma.⁷⁷ The most recent data show that exposure to even low levels of ozone is associated with an increased rate of mortality.⁷⁸

72. REGION 10, U.S. ENVTL. PROT. AGENCY, ENVIRONMENTAL FACT SHEET: BUNKER HILL SITE, NORTHERN IDAHO 1 (June 2004), [http://yosemite1.epa.gov/R10/CLEANUP.NSF/46453efc0be3985c88256d140050c1ac/0aa63d9677f0a58388256d1a007fac6f/\\$FILE/CDA%20NKellogg%20fs%205-27-04.pdf](http://yosemite1.epa.gov/R10/CLEANUP.NSF/46453efc0be3985c88256d140050c1ac/0aa63d9677f0a58388256d1a007fac6f/$FILE/CDA%20NKellogg%20fs%205-27-04.pdf).

73. REGION 10, EPA, BUNKER HILL FIRST FIVE YEAR REVIEW, *supra* note 70, at 1.

74. NAT’L ACADS, *supra* note 1.

75. *Id.*; accord Telephone Interview with Jerry Cobb, Panhandle Health District, Idaho (June 27, 2005).

76. NAT’L ACADS., *supra* note 1.

77. See, e.g., F. Broecker et al., *Lung Epithelial Damage at Low Concentrations of Ambient Ozone*, 353 LANCET 900, 900 (1999) (linking ground-level ozone to reduced lung function, asthma, and other chronic respiratory problems); Bert Brunekreef & Stephen T. Holgate, *Air Pollution and Health*, 360 LANCET 1233, 1233, 1236 (2002) (discussing the connection between particulate matter and ozone and respiratory health); Rob McConnell et al., *Asthma in Exercising Children Exposed to Ozone: A Cohort Study*, 359 LANCET 386, 386 (2002) (studying the relationship between outdoor exercise in polluted areas and the development of asthma).

78. Michelle L. Bell et al., *The Exposure-Response Curve for Ozone and Risk of Mortality and the Adequacy of Current Ozone Regulations*, 114 ENVTL. HEALTH PERSP. 532, 535 (2006), available at <http://www.ehponline.org/members/2006/8816/8816.pdf>.

Under the federal Clean Air Act, state environmental agencies were long ago supposed to have required risk reduction sufficient to ensure compliance with the National Ambient Air Quality Standards (NAAQS), standards designed to protect human health.⁷⁹ In many cases, however, state agencies have still not fulfilled this duty.⁸⁰ As a consequence, over 160 million people in the United States live in areas that do not comply with federal air quality standards addressing smog.⁸¹ In fact, the number of people exposed to unhealthy levels of ozone may be even greater than this, given data showing that standards more stringent than the new NAAQS would be necessary to protect against premature mortality due to ozone.⁸²

Having failed to reduce pollution to levels dictated by the NAAQS, agencies have turned to “ozone alerts,” which they issue on days when ozone levels are unsafe.⁸³ These ozone alerts recommend that everyone—particularly children, people with asthma or other respiratory conditions, the elderly, and those who work or exercise outside—curtail their outdoor activities during the day to avoid the adverse health effects of exposure.⁸⁴

Agencies have relied on ozone alerts in some areas for decades.⁸⁵ Some agencies, moreover, are devising ever more sophisticated warning systems, even as efforts to prevent or control emissions of oxides of nitrogen and volatile organic compounds lag.⁸⁶ The South Coast Air

79. Clean Air Act, 42 U.S.C. § 7409(b)(1) (2000).

80. U.S. ENVTL. PROT. AGENCY, 8-HOUR GROUND-LEVEL OZONE DESIGNATIONS, <http://www.epa.gov/ozonedesignations> (follow “State Designations” hyperlink; then search by EPA region and state to find areas that did not meet the national primary or secondary air quality standards as of April 15, 2004); see Thomas O. McGarity, *Missing Milestones: A Critical Look at the Clean Air Act’s VOC Emissions Reduction Program in Nonattainment Areas*, 18 VA. ENVTL. L.J. 41 (1999) (discussing the failure of states to attain the national ambient air quality standards despite a series of extensions and other efforts by Congress and the EPA to ease states’ burdens).

81. Traci Watson, *EPA Tells 1 in 7 U.S. Counties to Clean Up Smog*, USA TODAY, Apr. 16–18, 2004, at A1. It is estimated that some 100 million Americans live in areas that exceed even the current ozone standard. OFFICE OF AIR QUALITY PLANNING & STANDARDS, U.S. ENVTL. PROT. AGENCY, THE OZONE REPORT: MEASURING PROGRESS THROUGH 2003, 2 (2004), available at <http://epa.gov/air/airtrends/aqtrnd04/ozone.html>.

82. Bell et al., *supra* note 78, at 532, 535.

83. These advisories also go by other names, e.g., “smog alerts” or “clean air alerts.”

84. Federal ozone index values range from “good” to “moderate,” when it is recommended that “[u]nusually sensitive people should consider limiting prolonged outdoor exertion,” to “very unhealthy,” when it is recommended that “[a]ctive children and adults, and people with respiratory disease such as asthma should avoid all outdoor exertion” and “[e]veryone else should limit outdoor exertion.” *Id.*

85. The South Coast Air Quality Management District, for example, has issued ozone alerts since 1978. See, e.g., Matthew Neidell, *Information and Avoidance Behavior: Do People Respond to Smog Alerts?* (Nov. 2003) (unpublished manuscript), available at http://economics.uchicago.edu/download/abid_11_04.pdf.

86. See, e.g., Steven D. Cook, *Senators, Witnesses Say EPA Slow to Issue Rules, Guidance for Meeting Air Standards*, 218 BNA DAILY ENV’T. REP., Nov. 14, 2005, at A1, reprinted in 36 BNA ENV’T REP. No. 45, Nov. 18, 2005, at 2,333–34 (discussing statements during Senate Environment and

Quality Management District, for example, which regulates air quality in the highly polluted Los Angeles metropolitan area, recently developed a system that provides immediate electronic warnings to those at risk that participate in the program.⁸⁷

Agencies have allowed ozone alerts to supplant risk reduction, moreover, despite evidence that the number of individuals who suffer from asthma and other respiratory ailments triggered by exposure to ground-level ozone has continued to climb.⁸⁸ Currently, some 20 million Americans—including more than 6 million children—have asthma.⁸⁹ Studies in the United States have shown that emergency room visits due to asthma increase when ozone and/or particulate matter pollution are even slightly above levels permitted by the NAAQS.⁹⁰

In these and other contexts, government decision makers are turning to risk avoidance rather than risk reduction.⁹¹ In its forest management efforts, for example, the United States Forest Service relies on herbicide contact warnings to elicit avoidance from members of the various California tribes, who are exposed to herbicide residues when they tend, harvest, prepare, and weave plants in the process of making baskets.⁹² In their efforts to regulate

Public Works Subcommittee hearing that EPA's "slow pace" in issuing rules and guidance has hindered progress in attaining air quality standards for ozone and particulate matter).

87. South Coast Air Quality Management District, Board Meeting Minutes, *Pager Alert Pilot Survey*, tbl.1 (Dec. 10, 1999), available at <http://www.aqmd.gov/hb/1999/991210a.html>; see also Jack McCarthy, *Pagers to Carry Smog Alert—Instant Warning System Being Developed for People at Risk*, PRESS-ENTERPRISE, Sept. 17, 1998, at A1 (quoting South Coast Air Quality Management District board member Roy Wilson: "We felt we needed a way to tell people who are ill or at the playground when the air is very bad, so they would know they had better go indoors.").

88. NAT'L CTR. FOR HEALTH STATISTICS, CTRS. FOR DISEASE CONTROL & PREVENTION, *ASTHMA PREVALENCE, HEALTH CARE USE AND MORTALITY*, 2002, <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/asthma/asthma.htm> (last visited Oct. 12, 2006).

89. *Id.*

90. Paige Tolbert et al., *Air Quality and Pediatric Emergency Room Visits for Asthma in Atlanta, Georgia*, 151 AM. J. EPIDEMIOLOGY 798 (2000); Mary C. White et al., *Exacerbations of Childhood Asthma and Ozone Pollution in Atlanta*, 65 ENVTL. RES. 56, 62–63 (1994).

91. For additional examples, see O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 17–20.

92. The U.S. Forest Service (USFS) has opted to apply herbicides containing glyphosate, hexazinone, and triclopyr to recently logged or burned areas, in the process affecting native plants that are culturally important to the various California tribes and used for food, medicine, and basketry materials. Because these herbicide residues persist for up to 130 weeks, the California Department of Pesticides Regulation (CDPR) has issued warnings to California tribes and their members, who are exposed to the herbicides when they tend, harvest, prepare, and weave the plants in the process of making baskets. LIN YING LI, CAL. DEP'T OF PESTICIDE REGULATION, *DATA ANALYSIS OF FORESTRY HERBICIDE RESIDUES IN PLANTS OF INTEREST TO CALIFORNIA TRIBES 8–9* (2002). The USFS has embraced such "herbicide treatment programs" even as CDPR has "acknowledged that California tribal members' unique exposure scenarios are unaccounted for in the risk assessments conducted to set the parameters for use of these herbicides." See O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 15–17.

agricultural pesticides, federal and state agencies have issued standards that require farmworkers to observe a certain waiting period or “entry interval” before re-entering fields that have been sprayed with pesticides and have undertaken educational efforts, among other things, to get farmworkers to take steps to avoid taking home contaminated clothing or equipment that would expose their children to the pesticides with which they work.⁹³ State and local governments rely on beach advisories and closures when bacterial contamination—resulting in the main from combined sewer overflows and sanitary sewer overflows—renders swimming, surfing, and other recreational activities unsafe for humans.⁹⁴ State and local governments similarly look to “boil-water notices” to address bacterial contamination of drinking water sources.⁹⁵

Moreover, there is a real prospect of increasing calls for risk avoidance in the future. This is so in part because risk avoidance is likely to continue to appeal to those seeking to “reform” risk regulation along various lines. Calls for increased reliance on risk avoidance have come primarily from regulated industries that stand to reap the benefits of any cost savings from scaled-back risk reduction.⁹⁶ However, these calls might find theoretical

93. See discussion *infra* notes 144–47 and accompanying text. Note that EPA and other agencies have embraced this approach despite evidence that these standards are inadequate to protect children, who are often present in the fields alongside their parents. See, e.g., GEN. ACCOUNTING OFFICE, PESTICIDES: IMPROVEMENTS NEEDED TO ENSURE THE SAFETY OF FARMWORKERS AND THEIR CHILDREN (2000), available at <http://www.gao.gov/archive/2000/rc00040.pdf> (stating that EPA did not design entry intervals for children under 12); Eileen Gauna, *Farmworkers as an Environmental Justice Issue: Similarities and Differences*, 25 ENVIRONS ENVTL. L. & POL’Y J. 67, 68–69 (2002) (discussing standards for pesticide safety that are inadequate to protect children’s health). Note, too, that agencies and legislatures have embraced this approach in the face of public requests that several pesticides be phased out and, ultimately, banned in favor of alternatives that are less toxic to farmworkers. See, e.g., Shannon Dininny, *Debate over Pesticides, Exposure Growing Again*, SEATTLE POST-INTELLIGENCER, Feb. 21, 2005, http://seattlepi.nwsource.com/local/212874_gcenter21.html (noting the controversy over a bill in Washington state that would “phase out certain pesticides by 2012”).

94. According to the EPA’s most recent assessment of recreational beaches in the U.S. “of the 4,025 beaches that were monitored in 2005, 1,109 or 28 percent had at least one advisory or closing during the 2005 season.” U.S. ENVTL. PROT. AGENCY, EPA’S BEACH PROGRAM: 2005 SWIMMING SEASON UPDATE, available at <http://www.epa.gov/waterscience/beaches/seasons/2005/2005fs.pdf>. I am indebted to Bill Rodgers for this example. See William H. Rodgers, Jr., *Improving Laws, Declining World: The Tort of Contamination*, 38 VAL. U. L. REV. 1249, 1252 (2004) (discussing the magnitude and source of beach closures since 1988).

95. See U.S. ENVTL. PROT. AGENCY, WATER ON TAP: WHAT YOU NEED TO KNOW (2003), available at http://www.epa.gov/safewater/wot/pdfs/book_waterontap_full.pdf (indicating that water suppliers shall issue a warning when EPA standards are violated); see also Rodgers, *supra* note 94, at 1254 (noting that in a recent four-year period, “725 communities have issued ‘boil-water notices’ affecting three million people”).

96. See THOMAS O. MCGARITY ET AL., SOPHISTICATED SABOTAGE: THE INTELLECTUAL GAMES USED TO SUBVERT RESPONSIBLE REGULATION 3–4, 9–10 (2004) (arguing that regulated industries popularize a vision of regulation driven primarily by economic efficiency models, despite the serious shortcomings of these models).

moorings among proponents of economic efficiency as the aim of risk regulation.⁹⁷ These proponents may need little convincing that it would be more efficient to shift the burden to individual risk-bearers to protect themselves from a wide variety of pollution risks.

As well, risk avoidance may be seen as increasingly feasible, given the likely increasing availability of information—including genetic information—identifying individuals' circumstances in terms of susceptibility and exposure. This information would allow the responsibility for avoiding risks to be shifted and avoidance measures increasingly tailored to these individual risk-bearers.⁹⁸ Indeed, in view of such developments, Dan Tarlock has recently suggested that we revisit the assumption that "it would be unfair and inefficient to shift the burden of protection to [individual risk-bearers] for a wide variety of pollution risks."⁹⁹ Citing the work of the Environmental Genome Project, he has observed that we will increasingly have the tools at hand to hold individuals responsible for avoiding or mitigating the environmental risks they face.¹⁰⁰ Thus, he has ventured, these individuals might be required to move their place of residence, to stay indoors, to refrain from certain activities or pursuits, or to undergo medical monitoring or even prophylactic surgeries.¹⁰¹

Risk avoidance's promise and perils will be explored in Part II. Before turning to this task, it is necessary to highlight a unique feature of this regulatory approach: the nexus between risk avoidance and human exposure.

97. *Id.*

98. See, e.g., A. Dan Tarlock, *Genetic Susceptibility and Environmental Risk Assessment: An Emerging Link*, 30 *Envtl. L. Rep. (Envtl. Law Inst.)* 10,277, 10,277–78 (2000) (observing that the National Institute of Environmental Health Sciences' Environmental Genome Project is working to identify the 200 or so genes believed to determine human susceptibility to environmentally induced diseases and suggesting that risk avoidance might therefore be relied upon more heavily as a regulatory tool); ENVTL. GENOME PROJECT RESEARCH ACTIVITIES, PESTICIDE EXPOSURE AND NEUROLOGIC FUNCTION IN FARMWORKERS, available at <http://www.niehs.nih.gov/envgenom/abstract/z0149020.htm> (discussing research underway to assess neurologic effects of chronic low-level exposure to pesticides in farmworkers, evaluating, among other things, the role of genetic susceptibility); see generally Jamie A. Grodsky, *Genetics and Environmental Law: Redefining Public Health*, 93 *CAL. L. REV.* 171 (2005) (describing the potential effect of increased access to genetic data on environmental policy and risk assessment). Cf. David E. Adelman, *The False Promise of the Genomics Revolution for Environmental Law*, 29 *HARV. ENVTL. L. REV.* 117 (2005).

99. Tarlock, *supra* note 98, at 10,277.

100. *Id.* at 10,280.

101. *Id.* at 10,277–80.

C. Requisites for Risk Avoidance

With risk avoidance, the locus of regulatory activity shifts from source to receptor, from the entities and processes that produce environmental contaminants to the humans that are exposed to them. This shift has several consequences for government decision makers' role in risk regulation. A shift to risk avoidance requires ascertaining the possible means for avoidance and communicating the need for avoidance to those who are exposed. In order to do a colorable job of each of these tasks, decision makers must identify with precision those likely to be exposed.

In order to fashion risk avoidance strategies, government decision makers must first identify the options for avoidance. If the contaminant of concern is ground-level ozone in the Los Angeles air basin, the resulting risk of respiratory distress in adult asthmatics might be avoided by having those exposed stay indoors, by having them wear a respirator whenever they go outside, by having them move their place of residence or work to a region with better air quality, or by having them cease breathing. If the contaminant of concern is methylmercury in walleye caught in particular Wisconsin lakes, the resulting risk of adverse neurodevelopmental effects in children might be avoided by having their mothers eat other species of fish caught elsewhere, by having them eliminate fish from their diet entirely for their childbearing years, or by having them cease breastfeeding their infants. Which, if any, of these options is plausibly among the means for avoidance, of course, depends on the extent to which the practice or lifeway that exposes humans to risk is valued or thought to be essential and on the extent to which the prescribed avoidance measure is costly, burdensome, or thought to be impossible in the sense of occasioning profound anguish or encroaching on important values or rights.¹⁰²

A shift to risk avoidance also requires communicating the need for avoidance to those exposed. In order to rely on risk avoidance, government decision makers need to ensure that those exposed have been apprised of the need for avoidance and of the means for doing so. This communication effort requires health and environmental agencies to develop a knowledge of—and, ideally, a relationship with—the exposed subpopulation, group, or community.¹⁰³ In the first place, agencies need to determine to whom to

102. For a more extensive discussion of this point, see O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 28–40.

103. See, e.g., NAT'L ENVTL. JUSTICE ADVISORY COUNCIL, FISH CONSUMPTION AND ENVIRONMENTAL JUSTICE 107–27 (2001), available at http://www.epa.gov/compliance/resources/publications/ej/fish_consump_report_11-2/pdf [hereinafter NEJAC FISH CONSUMPTION REPORT] (discussing risk communication and fish consumption advisories).

address their message—risk communicators refer to this as their “target audience.”¹⁰⁴ Who fishes the waters of the Columbia Slough in Portland, Oregon? Who lives within the boundaries of the Bunker Hill Mining and Metallurgical Site? Who works in the fields and orchards in Eastern Washington? Once the particular audience is identified, agencies need to determine how those exposed receive information, i.e., in which language and via which media or informal channels.¹⁰⁵ Do they read English? Do they have access to the Internet? Are they required to obtain a fishing license (and any accompanying literature) from the state—and do they in practice?

In order to meet these requisites, government decision makers seeking to rely on risk avoidance must identify—and attempt to learn a fair amount about—those likely to be exposed. In a diverse society, different subpopulations, groups, or communities may live their lives in different ways, engaging in various practices or pursuits that expose them to environmental contaminants. They might have different understandings—perhaps profoundly different—about the value of the practices in question and the ease or anguish with which one or another avoidance measure might be undertaken. They might communicate about risk in diverse languages and by multiple avenues. If government decision makers are to ascertain the plausible options for risk avoidance, if they are to communicate competently with those exposed—both necessary if they hope to secure the behavioral changes that amount to avoidance¹⁰⁶—decision makers have to learn a considerable amount about the people facing risks: who they are, how they live, what they value. Indeed, government decision makers’ efforts here are often iterative and might be expected to continue to produce and refine information about those exposed.

In fact, as more information about those exposed has been gathered, various identifiable subpopulations have emerged as having particular circumstances—circumstances that turn out to be relevant not only to matters of implementation, but also to the prior determination whether to employ risk avoidance in lieu of risk reduction. These subpopulations

104. *See id.* at 108, 114–16 (criticizing the use of the term “target audience” as indicating a one-way flow of information rather than a two-way process); EPA, RISK COMMUNICATION GUIDANCE, *supra* note 15, at 3 (“Depending on the potential health effects, different audiences of fish consumers will be the targets of the risk communication efforts.”).

105. *See* NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 117–21 (discussing the need for appropriate message content and media).

106. *See, e.g.,* EPA, RISK COMMUNICATION GUIDANCE, *supra* note 15, at 2 (judging success of fish consumption advisories by how many in the target audience have understood and complied with the relevant advice); *accord* Pendergrass, *Redevelopment of Brownfields*, *supra* note 48, at 10,244 (noting that institutional controls “operate by inducing humans to modify their behavior”).

include (but are not limited to): children, women of childbearing age, asthmatics, fishing tribes, low-income individuals, farmworkers, and various Asian-American and Pacific Islander groups.¹⁰⁷ The identity of the subpopulations left to undertake avoidance may affect a societal assessment of whether risk avoidance is appropriate and, in some cases, may implicate various normative and positive legal commitments, points taken up later in this Article.

Risk reduction strategies (at least those driven by human health),¹⁰⁸ of course, also require government decision makers to understand human exposure and so to gather and respond to information identifying those exposed.¹⁰⁹ Standards directing risk-producers to prevent, limit, or clean up contaminants, however, can be set with a less intimate knowledge of those exposed. Because risk reduction does not rely on changing existing human behaviors or lifeways, it can proceed without ascertaining which alternatives are possible from whose perspective. By shifting the locus of regulatory engagement, then, from sources of environmental contamination to human receptors, risk avoidance reorients government decision makers' efforts, demanding of them—and charging them with—knowledge of who is at risk and what is at stake from the perspective of those at risk.¹¹⁰

II. RISK AVOIDANCE: PROMISE AND PERILS

There has not, to-date, been any systematic effort to consider and justify a shift to risk avoidance. This lack of critical attention may be due, in part, to the fact that risk avoidance strategies have only recently begun to be categorized and discussed as such.¹¹¹ Risk avoidance strategies are often

107. See, e.g., EPA, RISK COMMUNICATION GUIDANCE, *supra* note 15, at 27–41 (discussing particular circumstances and needs of various groups that comprise “target audiences” for fish consumption advisories); OFFICE OF WATER, U.S. ENVTL PROT. AGENCY, REPORT TO CONGRESS: EPA STUDIES ON SENSITIVE SUBPOPULATIONS AND DRINKING WATER CONTAMINANTS (1998), available at http://www.epa.gov/OGWDW/standard/rtc_sensubpops.pdf (discussing life stage, gender, genetic traits, health status, and exposure as factors relevant to the identification of sensitive subpopulations in the context of drinking water regulation).

108. Risk reduction strategies might be health-based or technology-based. One of the advantages of the latter is that regulation may proceed in the absence of complete data regarding the toxicity of and mechanisms of exposure to the contaminants to be regulated. See Wendy E. Wagner, *The Triumph of Technology-Based Standards*, U. ILL. L. REV. 83, 84–85 (2000) (discussing the advantages of using technology-based standards for pollution control).

109. For further discussion of this claim and its implications when Native peoples are among those exposed, see Catherine A. O'Neill, *Variable Justice: Environmental Standards, Contaminated Fish, and “Acceptable” Risk to Native Peoples*, 19 STAN. ENVTL. L.J. 3 (2000) [hereinafter O'Neill, *Variable Justice*].

110. See discussion *infra* at Part III.

111. See, e.g., O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 6 (noting the

referred to by different names¹¹² or discussed in terms of the particular category of avoidance measures (e.g., “fish consumption advisories,” “institutional controls”) at issue. Often, risk avoidance is soft-pedaled by proponents. The National Mining Association, for example, applauded the EPA’s decision in its Clean Air Mercury Rule (CAMR) to rely on fish consumption advisories in lieu of more substantial reductions in mercury emissions from coal-fired utilities, advocating what it euphemistically termed “dietary modification and education.”¹¹³ Similarly, the Electric Power Research Institute suggested that the effect of fish consumption advisories in this context would be to “redirect consumption” away from fish in water bodies with high levels of methylmercury, thus necessitating even less protective standards than proposed by EPA.¹¹⁴ And, to the extent that risk avoidance places responsibility on a relatively small (and often politically disempowered) portion of the population—typically tribes and their members, communities of color, and low-income communities—the shift to risk avoidance is likely to go undetected and unexamined by the majority of the population.¹¹⁵

The lack of attention to this shift may also be due to the fact that risk avoidance strategies are difficult to spot to the extent that they are enlisted alongside strategies that require some degree of risk reduction—but that stop short of reducing risks to levels that are safe, “acceptable,” or

recent reliance on risk avoidance for environmental regulation affecting Native peoples’ resources and rights); CTR. FOR PROGRESSIVE REGULATION, *A NEW PROGRESSIVE AGENDA FOR PUBLIC HEALTH AND THE ENVIRONMENT* 54 (Christopher H. Schroeder & Rena Steinzor, eds., 2005) (calling for risk reduction over risk avoidance).

112. The California Air Resources Board, for example, recently discussed measures to address environmental factors contributing to the high incidence of asthma, discussing “primary” and “secondary” strategies—the former referring to risk reduction, the latter to risk avoidance. CAL. AIR RES. BD., *EPIDEMIOLOGIC INVESTIGATION TO IDENTIFY CHRONIC EFFECTS OF AMBIENT AIR POLLUTANTS IN SOUTHERN CALIFORNIA* 275 (2004), available at <http://www.arb.ca.gov/research/abstracts/94-331.htm#Executive>.

113. NAT’L MINING ASS’N, DOCKET NO. OAR-2002-0056, COMMENTS ON PROPOSED NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (2004), available at <http://pubweb.epa.gov/mercury/pdfs/OAR-2002-0056-2434.pdf>.

114. RICHARD CARLTON ET AL., ELECTRIC POWER RESEARCH INST. (EPRI), DOCKET NO. OAR-2002-0056, EPRI COMMENTS ON EPA PROPOSED EMISSION STANDARDS/PROPOSED STANDARDS OF PERFORMANCE, ELECTRIC UTILITY STEAM GENERATING UNITS: MERCURY EMISSIONS 124 (2004); O’Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,108.

115. See CTR. FOR PROGRESSIVE REGULATION, *supra* note 111, at 42.

In many cases, the responsibility for avoiding the consequences of pollution can be shifted to the victims without most people noticing. . . . It is relatively easy for industries or the government to insist that risk reduction is the job of a minority of citizens, since the majority of people either won’t notice or won’t understand why there is a problem.

Id. See generally O’Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 25 (discussing risk avoidance and environmental justice).

technologically achievable. EPA's CAMR provides an example, inasmuch as it envisions some amount of mercury emissions reductions—albeit greatly decreased and delayed. It is the risk that remains as a result of this substantial reprieve to sources that must be avoided by those called upon to change their fish consumption practices. Similarly, use-restricted cleanups often employ institutional controls in lieu of cleanup at some portion of a contaminated site, as is the case at the Agricultural Street Landfill site in New Orleans, or in place of particular engineering controls that would ensure some further increment of protection of human health. In these instances, risk at the site is partially reduced; what remains, however, is left to be avoided by those exposed.

Finally, the absence of a systematic justification may be due to the fact that the shift to risk avoidance in some instances is subtle and proceeds incrementally. Measures initially designed to provide temporary warning of contamination while abatement proceeds apace remain in place for decades, ultimately becoming a staple of agencies' "risk management" efforts. Fish consumption advisories, as discussed above, are a case in point. Agencies have in numerous instances presided over what Bill Rodgers has termed "slow and sorry declines" in environmental quality—the gradual erosion of nature's "baseline," facilitated by regulatory compromises.¹¹⁶ These regulatory failures, Rodgers observes, have allowed warning statements to become a "norm."¹¹⁷ EPA in this administration has been especially bold in this regard: it has dragged its feet when required to regulate by risk reduction, missing even court-ordered deadlines;¹¹⁸ it has authorized compliance schedules for sources that postpone actual reductions into the next decade and beyond;¹¹⁹ it has scaled back its own performance

116. Rodgers, *supra* note 94, at 1249. By way of example, Rodgers cites "the flurry of regulatory compromises in EPA rulemakings [under the Toxic Substances Control Act] that secured PCBs as a pollution problem that will not go away." *Id.* at 1257 (citation omitted).

117. *Id.* at 1256–58.

118. See, e.g., Heinzerling & Steinzor, *Perfect Storm I*, *supra* note 21 (describing EPA's roles in a series of missed statutory and court-ordered deadlines for its rule governing mercury emissions from coal-fired utilities); U.S. GOV'T ACCOUNTABILITY OFFICE, CLEAN AIR ACT: EPA SHOULD IMPROVE THE MANAGEMENT OF ITS AIR TOXICS PROGRAM 15–18 (2006), <http://www.gao.gov/new.items/d06669.pdf> (stating that EPA has been chronically late in issuing regulations for emissions of hazardous air pollutants and noting that, because the agency fell behind in issuing maximum achievable control technology (MACT) standards, it is also now behind in issuing residual risk standards for these source categories); Steven D. Cook, *Senators, Witnesses Say EPA Slow to Issue Rules, Guidance for Meeting Air Standards*, BNA DAILY ENV'T. REP., Nov. 14, 2005, at A-1 (reporting on testimony before a Senate subcommittee that EPA's "slow pace in issuing rules and guidance has hindered its progress in achieving attainment of air quality standards for ozone and fine particulates").

119. See, e.g., O'Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,071 (describing the delay in mercury emissions reductions authorized by EPA's Clean Air Mercury Rule, under which the

targets for ensuring compliance;¹²⁰ it has underfunded cleanup and other risk reduction efforts;¹²¹ it has instructed staff and advisory groups to focus on avoidance strategies—even in the face of input to the contrary;¹²² and it has generally interpreted narrowly its authority to require risk reduction, while at the same time interpreting broadly its ability to provide “regulatory flexibility,” to enlist only “voluntary” efforts by sources, and otherwise to relieve sources of their obligations to reduce risk.¹²³

Whatever the reason, little discussion has surrounded the shift from risk reduction to risk avoidance. This dearth of critical attention is itself problematic, inasmuch as this shift implicates basic questions of value and justice in environmental policy and appears to be taking place in the relative absence of public debate. Indeed, the lack of considered public deliberation has led one commentator to describe one category of such approaches as a “sleeping giant.”¹²⁴

Nonetheless, several justifications might be gleaned from proponents’ calls for increased recourse to risk avoidance in lieu of risk reduction. While risk avoidance strategies may hold promise in some respects, they also introduce several perils. After exploring the promise and perils of risk avoidance in turn, this Part offers some observations about how the competing claims fare on balance. Ultimately, I conclude that the perils are many and serious, rendering risk avoidance inappropriate in most instances.

second-phase cap will not be imposed until 2018, and actual reductions are not expected until even later); David D. Kirkpatrick, *He’s Battered, But His Agenda Isn’t Beaten*, N.Y. TIMES, Mar. 5, 2006, § 4 (Week in Review), at 1 (describing EPA’s proposed standard, issued in December 2005, for industrial and vehicular soot, which grants a generous fifteen years for compliance in the most polluted counties).

120. See, e.g., Patricia Ware, *Drinking Water: EPA Proposes ‘More Realistic’ Target for Compliance with Federal Standards*, BNA DAILY ENV’T. REP., Sept. 11, 2006, at A-11 (recounting EPA’s proposal to lower its goal for the percentage of U.S. residents served by community water systems that are in compliance with all federal standards from 95% by 2008 to 91% by 2011).

121. See, e.g., Martina E. Cartwright, *Superfund: It’s No Longer Super and It Isn’t Much of a Fund*, 18 TUL. ENVTL. L.J. 299, 317–18 (2005) (evaluating CERCLA from its adoption to the present and criticizing the failure to reauthorize the Act’s taxing authority).

122. See O’Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 11 (relaying attempts by some EPA staff to redirect and cabin debate during the advisory committee process that culminated in the NEJAC Fish Consumption Report, so that it focused exclusively on refining fish consumption advisories).

123. See, e.g., Eileen Gauna, *EPA at 30: Fairness in Environmental Protection*, 31 Env’tl. L. Rep. (Env’tl. Law Inst.) 10,528, 10,533, 10,557–61 (May 2001) (observing that EPA has recently allowed greater permitting flexibility and at the same time refrained from vigorous enforcement); Heinzerling & Steinzor, *Perfect Storm I*, *supra* note 21; Lisa Heinzerling et al., Ctr. For Progressive Reform, *Mercury* (2005), available at <http://www.progressivereform.org/perspectives/mercury.cfm>.

124. Amy L. Edwards, *The Sleeping Giant Awakes: The Growing Public Debate About Institutional Controls*, A.B.A. ENVTL. TRANSACTIONS, AUDITS & BROWNFIELDS COMM. NEWSL. (Jan. 2001).

A. *The Promise of Risk Avoidance*

Risk avoidance is potentially promising and might be justified along a number of lines. Risk avoidance offers cost savings. Risk avoidance enhances autonomy or individual choice regarding risks. Risk avoidance increases individual responsibility for addressing risks. Risk avoidance discourages outlier or non-“normal” practices. This section elaborates each of these justifications.

1. Risk Avoidance Offers Cost Savings

Cost savings are the chief virtue of a move to risk avoidance. By limiting human exposure, “the same amount of human health protection” can be obtained without incurring the considerable costs of preventing, eliminating, or treating contamination. Risk avoidance can thus help to enhance the economic efficiency of environmental risk regulation, achieving the same benefits at a lower cost.

The argument for efficiency has been most clearly articulated in the context of use-restricted cleanups, where, proponents argue, risk avoidance might be employed to garner the same amount of human health protection at a “radically reduce[d]” cost.¹²⁵ At present, there exist no comprehensive data quantifying the cost savings from the use of institutional controls.¹²⁶ However, commentators have opined that the savings are “substantial”¹²⁷ and “can run into millions of dollars.”¹²⁸ Anecdotal accounts appear to bear this out, at least with respect to initial cost savings. At a former chromium

125. Philip E. Karmel, *Achieving Radical Reductions in Cleanup Costs*, 499 PRAC. LAW INST./REAL 371, 382–83 (Nov. 2003); see generally STEPHEN BREYER, *BREAKING THE VICIOUS CIRCLE* 11–19 (1993) (providing examples of how removal of all toxic contamination from a site “can involve limited technological choice, high cost, devotion of considerable agency resources, large legal fees, and endless argument”); Richard L. Revesz & Richard B. Stewart, *The Superfund Debate*, in *ANALYZING SUPERFUND: ECONOMICS, SCIENCE, AND LAW* 3, 14–16 (Richard L. Revesz & Richard B. Stewart eds., 1995) (observing that use restrictions are less costly than permanent cleanups, but allowing that nonpermanent restrictions ignore future enforcement costs, environmental justice concerns, and some health costs); David F. Coursen, *Institutional Controls at Superfund Sites*, 23 *Env'tl. L. Rep. (Env'tl. Law Inst.)* 10,279 (May 1993) (discussing the limitations of institutional controls).

126. E-mail from Michael Bellot, Director, Institutional Controls Program, Environmental Protection Agency, to author (Aug. 31, 2005) (explaining that no study quantifying the cost savings of institutional controls exists and that EPA has been working on compiling these data since 2001, a task complicated by a number of factors).

127. Geisinger, *supra* note 47, at 369 (citing “substantial” cost savings associated with use-restricted cleanups). Note that Geisinger at the same time challenges the assumption that such use-restricted cleanups actually result in the “same amount” of health protection. *Id.* See *infra* notes 198 and accompanying text.

128. Richard G. Opper, *The Brownfield Manifesto*, 37 *URB. LAW.* 163, 184 (2005).

processing site in Jersey City, New Jersey, cleanup costs could be reduced by \$100 million—from \$400 million to \$300 million—if hexavalent chromium wastes were permitted to be left on-site and capped rather than removed to a licensed disposal site.¹²⁹ At a toxic waste dump in southern New Hampshire, cleanup costs could be reduced by \$9.3 million if a certain amount of PCBs, benzene, and other volatile organic compounds were allowed to remain on-site rather than removed and incinerated.¹³⁰

Although less clearly articulated in other contexts, cost savings are likely to be the primary impetus for a move to risk avoidance here as well. In commenting on the CAMR, for example, the National Mining Association called for reliance on risk avoidance in the form of fish consumption advisories, citing advisories' cost effectiveness relative to decreasing mercury emissions from coal-fired utilities.¹³¹ Similarly, Ted Gayer and Robert Hahn make an implicit case for risk avoidance in this context when they argue that the government should not have regulated mercury emissions from coal-fired utilities at all, given their calculation that the benefits of doing so would be outstripped by the costs.¹³² More generally, Tarlock's call to consider a shift to risk avoidance highlights "efficiency" as one of two axes along which such a move might prove advantageous.¹³³ As in the case of institutional controls, data quantifying the cost savings from a shift to risk avoidance in these other contexts are incomplete.¹³⁴ However, given the substantial literature suggesting that risk

129. Anthony DePalma, *Finding the Bottom of a Polluted Field*, N.Y. TIMES, Feb. 5, 2006, at 27. This estimate of the cost savings is attributed to Katherine L. Adams, vice president and general counsel at Honeywell Corporation, the corporate successor to Allied Signal and Mutual Chemical Company (which operated one of the world's largest chromium processing plants) and the party responsible for financing cleanup at the site. *Id.*

130. BREYER, *supra* note 125, at 11–12. *But cf.* Adam N. Finkel, *A Second Opinion on an Environmental Misdiagnosis: The Risky Prescriptions of Breaking the Vicious Circle*, 3 N.Y.U. ENVTL. L.J. 295, 313–15 (1995) (arguing that the *Ottati & Goss* case from which Breyer takes this example is actually an exceptional, rather than typical, case and questioning Breyer's factual claim that the site would be "mostly cleaned up" in the absence of additional cleanup efforts and, consequently, expenditures).

131. NAT'L MINING ASS'N, *supra* note 113, at 8.

132. Ted Gayer & Robert Hahn, *The Political Economy of Mercury Regulation*, REGULATION, Summer 2005, at 26, 32. Gayer and Hahn make the case for risk avoidance in lieu of risk reduction if one assumes that the course of action they propose means that the risks of human exposure to mercury (which, they suggest, are overstated) would be addressed by means of the status quo roster of fish consumption advisories, as was assured by EPA. It is, of course, possible that Gayer and Hahn would also find this risk avoidance measure unsupportable by their cost-benefit criterion.

133. Tarlock, *supra* note 98, at 10,277.

134. *See, e.g.*, Paul Jakus et al., *The Benefits and Costs of Fish Consumption Advisories for Mercury* (Resources for the Future, Discussion Paper 02-55 2002), available at <http://www.rff.org/Documents/RFF-DP-02-55.pdf> (stating that uncertainty limits confidence in estimated cost savings from mortality reduction related to mercury consumption advisories).

regulation currently entails large costs,¹³⁵ it is likely that there are indeed opportunities for cost savings in numerous contexts. Although the promise of reduced costs stands as the primary rationale for a move to risk avoidance, other reasons might support this move as well.

2. Risk Avoidance Enhances Autonomy

Risk avoidance strategies entail greater autonomy or individual choice. Individuals have different preferences regarding risk. They differ in their general willingness to bear risk, and they differ in their perception of—and tolerance for—particular risks. In order to respect individuals' autonomy, risk regulation needs to account for these differences. Because risk avoidance strategies leave it to the individual to decide whether to alter the practices that expose her to environmental contaminants, they accommodate choice and so demonstrate respect for these differences. No one is compelled to support more risk reduction than she would choose.

W. Kip Viscusi and Ted Gayer, for example, make an autonomy-based claim in the context of health and safety warnings:

Unlike technology-forcing regulations that constrain individual choice, hazard warnings potentially can work through the market by providing consumers and workers with needed information. . . . [C]hoices by consumers and workers subject to the receipt of the information would be respected so that market forces would permit people to make choices consistent with their own risk-cost balancing rather than being subject to uniform regulatory standards that almost invariably fail to recognize such differences in individuals' willingness to bear risk.¹³⁶

In the context of cleanups at hazardous waste sites, some proponents have invoked autonomy arguments on behalf of those who will live with the

135. See, e.g., BREYER, *supra* note 125, at 12–13; W. Kip Viscusi & Ted Gayer, *Safety at Any Price?*, REGULATION, Fall 2002, at 54, 55–56 (arguing that an “unbounded commitment to safety” has been very costly). *But cf.* FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 41–60 (The New Press 2004) (discussing how the purported costs of regulation are often grossly inflated).

136. Viscusi & Gayer, *supra* note 135, at 60. *But cf.* Clifford Rechtschaffen, *The Warning Game: Evaluating Warnings Under California's Proposition 65*, 23 ECOLOGY L.Q. 303, 317 n.72 (1996) (stating that individuals exposed to contaminants in the environment, rather than as consumers or workers, “have no traditional ‘market’ in which they can express their preferences” and observing that residents might “theoretically sell their homes and leave the area, but this is not a realistic option for most people, and in any case, does not exert any economic pressure on the entity responsible for the exposures”).

higher levels of risk that remain when risk reduction is not pursued. Citing the fact that “[r]isk is inherently subjective,” Richard Opper posits that many of those in communities desperate for the jobs or amenities associated with redevelopment might find “acceptable” risk at levels greater than the “one-in-a-million” figure that is the standard for carcinogens.¹³⁷ Cleanup here might be pursued to a less protective level, he argues, and the projects “can incorporate signage to indicate the increased risk so that those who are concerned can avoid the site.”¹³⁸

Autonomy arguments often appear alongside welfare-based arguments for individuated risk. Although Cass Sunstein does not make the case for risk avoidance as such, his arguments in the more general context of risk regulation might be enlisted in the service of increased use of risk avoidance. Sunstein observes that individuals vary greatly in their desire to have different risks reduced and argues that “[i]f different people have different tastes and tolerances for risk, government should recognize that fact.”¹³⁹ This is so, he argues, for two reasons. First, from the standpoint of welfare, government ought to respect individuals’ different perceptions of risk because people’s choices regarding risk reduction, as expressed through their willingness to pay (WTP), are a good guide to their own welfare. Second, from the standpoint of individual autonomy, government ought to respect individuals’ different tolerances for risk because people ought to be treated with respect, which includes permitting them to use their resources as they see fit.¹⁴⁰

3. Risk Avoidance Increases Individual Responsibility

Risk avoidance strategies increase individuals’ responsibility for addressing the risks they face.¹⁴¹ Risk can be viewed as a result of the coincidence in time and space of two incompatible elements: environmental contaminants and human (and ecological) receptors that might be harmed

137. See, e.g., Opper, *supra* note 128, at 184–87. Opper, an attorney representing developers, makes it clear who it is that he assumes comprises the communities faced with such “choices”: these are “underserved and underprivileged minority neighborhood[s] of color.” *Id.* at 186. See discussion *infra* Part II.C.3.

138. *Id.* at 185.

139. CASS R. SUNSTEIN, *LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE* 152 (2005) [hereinafter SUNSTEIN, *LAWS OF FEAR*].

140. *Id.*

141. Arguments for “individual responsibility” in this context should be distinguished from arguments made in instances where individuals are the *source* of environmental pollutants. See, e.g., Michael P. Vandenberg, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 VAND. L. REV. 515, 518 (2004).

by contact with those contaminants.¹⁴² As such, any measures that mitigate this coincidence—whether required of “risk-producers” or “risk-bearers”—might properly be considered among the menu of options for risk regulation. Strategies that require risk-bearers to act, then, reflect a choice among the possible ways to allocate responsibility for addressing risk, one that locates responsibility with those whose practices or lifeways expose them to environmental contaminants.

Tarlock, for example, holds out hope that the increasing availability of information regarding individuals’ susceptibility will enable agencies to tailor regulation and require those exposed to take individual avoidance steps:

Our current regulatory strategy for toxic pollutants is second-best. Ideally, regulation would be based on deterministic causal relationships between exposure and illness or genetic mutation, but this level of certainty is not [currently] possible At the present time, we lack the information to “force” greater individual responsibility for most harms that result from general environmental exposure. . . . We are presumed to be “victims” of environmental pollution with little or limited capacity to mitigate the harm of exposure. For example, asthmatics and other at-risk populations are not expected to move from ozone nonattainment areas designated by the Clean Air Act. At most, they are expected to refrain from strenuous activities on ozone alert days.¹⁴³

EPA recently sounded the theme of individual responsibility when it marked “World Asthma Day” with a press release entitled “More Than 70 Percent Could Better Manage Asthma Triggers, EPA Survey Finds.”¹⁴⁴ EPA focuses exclusively on actions individuals could be taking to avoid exposure to “asthma triggers,” such as “secondhand smoke, cockroaches, dust mites, mold, and ozone.”¹⁴⁵ EPA celebrates its efforts to raise public awareness among the millions of Americans with asthma and to encourage them to take steps to avoid exposure. EPA highlights a host of initiatives;

142. See R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960) (criticizing arguments for internalizing negative externalities from industrial pollution and arguing that social costs are reciprocal).

143. Tarlock, *supra* note 98, at 10,278–80.

144. Press Release, U.S. Env'tl. Prot. Agency, *More Than 70 Percent Could Better Manage Asthma Triggers, EPA Survey Finds* (May 3, 2005), available at <http://yosemite.epa.gov/opa/admpress.nsf/b1ab9f485b098972852562e7004dc686/96ccf5f4b45ec5a885256ff600682acb!OpenDocument>.

145. *Id.*

from health care providers' educational efforts to an EPA partnership with the Ad Council to produce public service announcements "describing simple steps parents can take to reduce asthma triggers commonly found in homes, daycares, and schools."¹⁴⁶ However, EPA nowhere mentions any possibility for reducing the pollutants that lead to ground-level ozone formation from industrial and other sources.¹⁴⁷

Note that a particularly invidious version of the call for individual responsibility occurs in the form of proponents' efforts to blame the risk-bearers for being exposed.¹⁴⁸ One commentator, for example, suggests that "[t]he explanation for high asthma rates in the inner city is as obvious as it is unpleasant: a combination of poor housekeeping practices with run-down, cockroach-infested housing."¹⁴⁹ The solution, this commentator argues, is to look past the sources of air pollution and instead "to recommend that parents be more diligent with their Hoovers."¹⁵⁰ In a similar vein, the National Mining Association invokes the language of criminology to argue for more lenient standards for mercury emissions from coal-fired utilities, casting the risk-bearers as "women of child-bearing age with a *propensity* to consume seafood containing high levels of methylmercury."¹⁵¹

4. Risk Avoidance Discourages Outlier Practices

Risk avoidance can discount or discourage practices that are deemed unnecessary or outside the norm. When a practice or pursuit leaves individuals exposed to environmental contaminants, risk avoidance asks them to change their ways. To the extent that it is desirable to reduce the prevalence of certain frivolous or outlier practices, risk avoidance can facilitate this effort.

Some proponents of risk avoidance have suggested that discouraging unnecessary practices is a salutary effect of risk avoidance. An oil industry executive took this tack in arguing for less protective ozone standards: "On bad air days, people can protect themselves. They can avoid jogging.

146. *Id.*

147. *Id.*

148. See CTR. FOR PROGRESSIVE REGULATION, *supra* note 111, at 41-55 (documenting, in a chapter entitled "Shifting the Blame," the point that "[i]n recent years, industry and government political appointees have labored to shift responsibility for addressing the consequences of pollution from the polluters to their victims").

149. Steven J. Milloy, Editorial, *A Second Look at the Asthma Epidemic*, WASH. TIMES, Apr. 16, 1998, available at <http://www.junkscience.com/news2/asthma.htm>.

150. *Id.*

151. NAT'L MINING ASS'N, *supra* note 113, at 8 (emphasis added).

Asthmatic kids need not go out and ride their bicycles.”¹⁵² Again, in the debate about mercury contamination, the Utility Air Regulatory Group suggested that eating fish—or at the very least fish from the vast expanses of waters currently covered by mercury advisories—is not necessary: “[T]he primary purpose for fish advisories is to warn the public about *undue* consumption of fish from given water bodies.”¹⁵³

This argument for risk avoidance is often not made explicit. At times, it is displayed in the form of ignorance of or incredulity regarding non-majority practices. For example, a stakeholder made the rhetorical case for less protective assumptions regarding fish consumption in Washington’s state cleanup provisions by asking, “*Who in the world* would expect their fish diet to come from the same contaminated source[?]”¹⁵⁴—despite the longstanding presence of numerous tribes in the area whose members fish from the same spots and consume large quantities of the fish they catch (indeed, who have treaty-guaranteed rights to do so).¹⁵⁵ Note, however, that this perspective is more likely to be made transparent where the practices and lifeways at issue are those of tribes or other non-dominant groups.¹⁵⁶

B. *The Perils of Risk Avoidance*

Risk avoidance is also perilous for several reasons. First, risk avoidance narrows the focus of environmental regulatory efforts, foregoing a web of ancillary benefits to human and ecological health. Second, risk avoidance often misses the complete roster of target human health effects. Third, risk avoidance is ineffective, frequently failing to achieve the behavioral changes necessary for avoidance. Additionally, risk avoidance offers diminishing and, ultimately, finite options for managing environmental risks. Risk avoidance also often introduces risks. Risk

152. Edward F. Snyder, Editorial, *Clinton’s Decision Good One for Maine and All Its Children by Standing up to EPA’s Critics, He Will Help Asthmatics and Others Breathe Better*, PORTLAND PRESS HERALD, June 28, 1997, at 9A.

153. COUNSEL FOR UTILITY AIR REGULATORY GROUP, U.S. ENVTL. PROT. AGENCY, DOCKET ID NO. OAR-2002-0056, COMMENTS ON THE PROPOSED NATIONAL EMISSIONS STANDARD FOR HAZARDOUS AIR POLLUTANTS 27–28 (2004) (emphasis added). The “UARG is a voluntary, nonprofit association of electric generating companies and organizations and four national trade associations (the Edison Electric Institute, the National Rural Electric Cooperative Association, the American Public Power Association, and the National Mining Association).” *Id.* at 1 n.1.

154. WASH. STATE DEP’T OF ECOLOGY, RESPONSIVENESS SUMMARY FOR THE AMENDMENTS TO THE MODEL TOXICS CONTROL ACT CLEANUP REGULATION: CHAPTER 173-340 WAC, at 217 (1991) (emphasis added), available at <http://www.ecy.wa.gov/programs/tcp/regs/1991%20Responsiveness%20Summary.pdf>.

155. *Id.*

156. This claim is elaborated at length in O’Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13.

avoidance discourages plural and diverse practices. Finally, risk avoidance is often unjust. This section explores each of these perils.

1. Risk Avoidance is Myopic

Risk avoidance is myopic: it narrows the focus of environmental regulation. Risk avoidance targets only human health effects and considers only specific, direct threats to human health. Risk avoidance measures seek to break the chain connecting contamination with adverse human health effects by focusing on a link late in the chain—the point of human exposure. These measures therefore leave unaddressed the myriad other effects of contamination.

Risk avoidance declines entirely to address adverse effects on any non-human components of ecosystems. Signs erected along the South Fork of the Coeur d'Alene River warning of lead-contaminated sediments do not reach the mergansers and other waterfowl that live on the river.¹⁵⁷ Pamphlets posted on the EPA website or distributed through grocery stores suggesting that foods treated with pesticides be washed, peeled, or trimmed¹⁵⁸ do not reach the salmon that swim in contaminated watercourses. These salmon not only suffer adverse effects themselves, but also transport pesticides in their tissue as they migrate, thereby affecting predators such as bald eagles, bears, and grayling in far-flung ecosystems.¹⁵⁹ This exclusion of non-human environmental health is at odds with the understanding that human health is but one element of environmental law and policy efforts—an understanding that is enshrined in a number of environmental statutes that form the core of environmental law, such as the Endangered Species Act, which ensures the conservation of endangered species and the ecosystems on which they depend,¹⁶⁰ and section 112 of the Clean Air Act, which protects human and environmental health from the adverse effects of hazardous air pollutants.¹⁶¹ This lack of concern for non-human health, moreover, is troubling to those who

157. See, e.g., Julia Silverman, *Death of Fish-Eating Birds Alarms Biologists—Lead Poisoning Moves up the Food Chain*, SPOKESMAN REV. (Spokane, WA), Aug. 11, 2001, at A1 (“[T]here’s no way to put up signs warning mergansers and other wildlife not to eat fish because of possible [lead] contamination.”).

158. OFFICE OF PESTICIDES PROGRAM, U.S. ENVTL. PROT. AGENCY, PESTICIDES AND FOOD: WHAT YOU AND YOUR FAMILY NEED TO KNOW 3, available at <http://www.epa.gov/pesticides/food> [hereinafter EPA, PESTICIDES AND FOOD].

159. See, e.g., Goran Ewald et al., *Biotransport of Organic Pollutants to an Inland Alaska Lake by Migrating Sockeye Salmon* (*Oncorhynchus nerka*), 51 ARCTIC 40, 45 (1998) (finding that pollutants in salmon are directly transferred to predators through the process of bioaccumulation).

160. Endangered Species Act of 1973, 16 U.S.C. § 1531(b) (2000).

161. Clean Air Act, 42 U.S.C. § 7412(f) (2000).

understand not only ecological health but also human, cultural, and spiritual well-being to be at stake. Such a myopic focus is troubling, for example, for the Minnesota Chippewa Tribe, for whom loons, mink, and other animals affected by methylmercury contamination are valued as parts of an integrated ecosystem and are considered culturally important, serving as clan symbols.¹⁶²

Even if one's concern is chiefly with human health, however, risk avoidance may ultimately fail to address many direct and indirect effects on humans. Thus, whereas a risk avoidance measure may target a particular contaminant's direct effects on human health, e.g., its toxicity to humans, the measure may neglect its indirect effects, e.g., its capacity to deplete resources on which humans depend. For example, the current regulatory scheme for pesticides relies in part on risk avoidance measures that target two categories of human exposure: consumers' exposure to "pesticide residue[s] in or on food"¹⁶³ and farmworkers' occupational exposure to pesticides.¹⁶⁴ As to the first category, EPA has published a brief pamphlet that suggests means for consumers to avoid residues on foods that have been treated with pesticides (e.g., washing, peeling, or trimming fruits and vegetables). The pamphlet also indicates that consumers have a right to know when EPA has permitted a pesticide to be used despite a finding of unacceptable health risks to consumers—in which case EPA will help direct consumers to alternative foods that are "equally nutritious."¹⁶⁵ As to the second category, EPA has issued a Worker Protection Standard that requires farmworkers to observe a certain waiting period or "restricted-entry interval" before reentering fields that have been sprayed with pesticides.¹⁶⁶ Yet these pesticides or their breakdown products eventually enter the watercourses that support fish and other aquatic life.¹⁶⁷ There is evidence that numerous pesticides impair several crucial physiological functions in both Pacific and Atlantic salmon, ultimately contributing to diminished reproduction and decreased populations of these species.¹⁶⁸

162. MINN. CHIPPEWA TRIBE, DOCKET NO. OAR-2002-0056, COMMENTS ON EPA'S MERCURY REDUCTION RULE 1-2 (2004). "Mercury is known to seriously impact fish eating wildlife such as loons and mink. These animals are a value to the ecosystem they inhabit and they are clan symbols for Tribal members. If these animals are threatened, Tribal culture is threatened." *Id.*

163. Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 346a(a)(1) (2000).

164. Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. § 136w(a)(1) (2000).

165. EPA, PESTICIDES AND FOOD, *supra* note 158.

166. 40 C.F.R. § 170.112(a)(1) (2005).

167. *See, e.g.*, U.S. GEOLOGICAL SURVEY, PESTICIDES IN THE NATION'S STREAMS AND GROUND WATER, 1992-2001, at 7 (2006), available at <http://water.usgs.gov/pubs/circ/circ1291> (finding pesticides present in groundwater wells, streams, and rivers at levels that could pose a threat to aquatic life and to fish-eating wildlife).

168. *See, e.g.*, Jason F. Sandahl et al., *Odor-evoked Field Potentials as Indicators of Sublethal*

Human health is thus indirectly impacted to the extent that humans rely on salmon for food and, in some cases, for economic, cultural, and spiritual well-being.¹⁶⁹

Or, whereas risk avoidance may take aim at the current human health effects of contamination left in place, it may fail to consider the human health effects should the contaminants migrate or otherwise behave unpredictably in the environment. For example, recent reviews of the Superfund cleanup at the Bunker Hill Mining and Metallurgical Site in the Coeur d'Alene River Basin have identified several instances in which lead has migrated to recontaminate areas that have already been cleaned up.¹⁷⁰ Soils contaminated with lead are eroding from surrounding hillsides, are being tracked by vehicles from unpaved surfaces, or are otherwise migrating into relatively clean areas, including residential yards that have already been remediated.¹⁷¹ Additionally, contaminated sediments in the riverbeds may be carried downstream with the currents or upland with the basin's frequent floodwaters, contaminating or recontaminating sediments and soils with lead and other heavy metals.¹⁷² As EPA and the National

Neurotoxicity in Juvenile Coho Salmon (Oncorhynchus kisutch) Exposed to Copper, Chlorpyrifos, or Esfenvalerate, 61 CAN. J. FISHERIES & AQUATIC SCIENCES 404, 412 (2004) (explaining how sublethal effects of pesticides on salmonids include the loss of olfactory function, which interferes with survival, migration, and reproduction); B. D. Johnston et al., *Biochemical Effects of Didecyldimethylammonium Chloride (DDAC) Exposure and Osmoregulatory Stress on Juvenile Coho Salmon, Oncorhynchus kisutch*, 34 ARCHIVES ENVTL. CONTAMINATION & TOXICOLOGY 275 (1998); Andrew Moore & Nicola Lower, *The Impact of Two Pesticides on Olfactory-mediated Endocrine Function in Mature Male Atlantic Salmon (Salmo salar L) Smolts*, 222 AQUACULTURE 253 (2001); Andrew Moore & Colin P. Waring, *The Effects of a Synthetic Pyrethroid Pesticide on Some Aspects of Reproduction in Atlantic Salmon (Salmo salar L)*, 52 AQUATIC TOXICOLOGY 1, 8–10 (2001) (discussing the deleterious effects of pyrethroid pesticides on Atlantic salmon reproduction).

169. See, e.g., NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 93–94 (citing Swinomish Indian Tribal Community, Comments on the Draft NEJAC Fish Consumption Report (Feb. 5, 2002)).

In the Swinomish Indian Tribal Community, fish and shellfish represent vital subsistence and commercial resources for the Tribe as well as an important point of cultural association for the Tribe's identity. Employed in cultural and religious ceremonies, incorporated in the common diet, and sold to support families on the Reservation, the current ecological status and fate of these species is of utmost interest to the Tribe.

Id.

170. U.S. ENVTL. PROT. AGENCY, SECOND FIVE-YEAR REVIEW FOR THE BUNKER HILL MINING AND METALLURGICAL COMPLEX SUPERFUND SITE (2005) [hereinafter EPA, BUNKER HILL SECOND FIVE-YEAR REVIEW]; NAT'L RES. COUNCIL, SUPERFUND AND MINING MEGASITES, *supra* note 66, at 70, 212, 346.

171. EPA, BUNKER HILL SECOND FIVE-YEAR REVIEW, *supra* note 170.

172. NAT'L RES. COUNCIL, SUPERFUND AND MINING MEGASITES, *supra* note 66, at 400. Note that this finding led the National Academy of Sciences to recommend that EPA remove the largest sources of contaminated sediments from the affected rivers, particularly those in locations most likely to be carried downstream and to criticize the EPA for failing to account for the basin's frequent floods which, among other things, could lead to recontamination of soils and sediments that had previously

Academy of Sciences have recognized, this migration undermines the assumptions on which current remediation efforts and institutional controls are based.¹⁷³ In a similar vein, lead, arsenic, and PAHs left untreated in the “undeveloped” portion of the Agriculture Street Landfill Site in New Orleans remain a potential threat to human health. As noted above, the ATSDR and others have found evidence that humans continued to access the area, despite the presence of a fence. People use the area for storage of Mardi Gras floats and other vehicles—vehicles that potentially track contaminants into clean areas of the site.¹⁷⁴ In addition, when Hurricane Katrina hit New Orleans, the entire site was inundated and remained under water for days.¹⁷⁵ Although data are still being gathered, there is evidence that lead, arsenic, and other contaminants were carried by floodwaters and may now contaminate the soils at the site and across much of New Orleans.¹⁷⁶

Given the vast gaps in our current understanding of relationships among the various components (including human components) of ecosystems, it is quite plausible that contamination left unabated will ultimately contribute to indirect or direct human health effects in the present and future generations.

2. Risk Avoidance May Be Off Target

Risk avoidance efforts may be underinclusive or off target. Because risk avoidance focuses on the point of human exposure, it depends on a complete understanding of the human health endpoints involved and the pathways and circumstances of human exposure. Where such understandings are less than complete, warnings will miss their mark and institutional controls will be misconceived. For example, current risk

been cleaned up. *Id.* at 400–01.

173. *Id.*

174. See discussion *supra* notes 60–64 and accompanying text.

175. See Eilperin, *supra* note 64 (observing that “much of [the water] trapped inside New Orleans had infiltrated the waste [site] and absorbed a range of contaminants”). See generally Knickerbocker & Jonsson, *supra* note 64 (discussing how “toxicants such as petroleum products, paints, and acids” will continue to cause problems after floodwaters recede).

176. AGENCY FOR TOXIC SUBSTANCES DISEASE REGISTRY, CTNS. FOR DISEASE CONTROL, HEALTH CONSULTATION: HURRICANE RESPONSE SAMPLING ASSESSMENT FOR THE AGRICULTURAL STREET LANDFILL SITE 7 (2006), available at http://www.dhh.louisiana.gov/offices/miscdocs/docs-205/PHA/AgricultureStLandfill-NewOrleansHC082906_1.pdf (finding that that majority of contaminants detected in flood-deposited sediments and soils at the site posed “no apparent public health hazard,” but that PAHs in concentrations of concern were present at the north end of the site and so posed an “indeterminate public health hazard” at the site); Spencer S. Hsu & Juliet Eilperin, *Safety of Post-Hurricane Sludge Is Disputed*, WASH. POST, Feb. 23, 2006, at A3.

avoidance measures for methylmercury focus on its neurodevelopmental effects. Thus, fish consumption advisories are aimed primarily at women of childbearing age and children.¹⁷⁷ Yet the most recent studies reveal that methylmercury also adversely affects the cardiovascular system in adult males.¹⁷⁸ This health endpoint and subpopulation at risk are largely missed by advisories. Or, for example, consumption advisories for methylmercury may only address fish, but humans may also consume other species contaminated with methylmercury, such as wild duck, for which no advisories have been issued.¹⁷⁹ Consumption advisories may also fail to mention particular parts, preparation methods, or uses of contaminated species—such as the bones, or internal organs of fish used by Russian immigrant communities along the Spokane River to make soup,¹⁸⁰ or the clams used by Suquamish tribal members to alleviate their children's teething pain¹⁸¹—perhaps because health and environmental agencies are unaware of such practices.¹⁸²

Ultimately, the exposure scenarios around which risk avoidance measures are crafted may prove off base because future land or resource uses are not accurately foreseen. For example, at the Agriculture Street Landfill site, the five-year review indicated that measures, such as instructions to property owners, designed to ensure the integrity of the engineering controls in the residential area failed adequately to anticipate and address property owners' routine maintenance activities, including tree

177. See, e.g., EPA, MERCURY ADVISORY FOR WOMEN AND CHILDREN, *supra* note 16.

178. See, e.g., NAT'L RES. COUNCIL, *supra* note 19, at 18; Eliseo Guallar et al., *Mercury, Fish Oils, and the Risk of Myocardial Infarction*, 347 NEW ENG. J. MED. 1747, 1752 (2002). *But cf.* Kazuko Yoshizawa et al., *Mercury and the Risk of Coronary Heart Disease in Men*, 347 NEW ENG. J. MED. 1755, 1759 (2002) (finding a "positive but not significant association between mercury levels and the risk of coronary heart disease").

179. See, e.g., FOND DU LAC BAND OF LAKE SUPERIOR CHIPPEWA, DOCKET NO. OAR-2002-0056, COMMENTS ON THE NOTICE OF DATA AVAILABILITY FOR THE CLEAN AIR MERCURY RULE 3 (2004) (noting that tribal members are exposed to methylmercury not only through fish consumption but also through other food sources, including waterfowl, and stating that tests conducted by the tribe revealed some species of wild duck to be contaminated at levels similar to those found in fish tissue). Note that in 2005, Utah became the first state to issue a waterfowl consumption advisory due to mercury contamination. It advised against any consumption of two species of wild duck, the Common Goldeneye and Northern Shoveler, harvested from Great Salt Lake marshes. UTAH DEP'T OF HEALTH, UTAH WATERFOWL ADVISORY 1 (2005), available at http://health.utah.gov/epi/enviroepi/water_fowl_homepage.doc.

180. Karen Dorn Steele, *Agencies Warn of Lead in River's Fish; Advisory Targets Consumption of Contaminated Fish Caught in Stretch of Spokane River*, SPOKESMAN REV. (Spokane, WA), June 21, 2000, at A1. "Russians and other immigrants said they use the whole fish, including bones and internal organs, in fish stews. The lead concentrates in bone and brains, the fish study showed." *Id.*

181. NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 35 (noting that "[c]hildren still teethe on dried clams").

182. See generally *id.* at 34–40.

planting. Whereas the instructions addressed handling and cultivating soils above the geotextile barrier (on top of which two feet of clean fill had been placed), they did not address handling and disposing of any soils excavated beneath the barrier.¹⁸³ At numerous other sites, future land uses once thought highly unlikely may come to pass, as former industrial sites become desirable urban residential properties and former mining or agricultural wastelands become attractive rural retreats.¹⁸⁴

3. Risk Avoidance Is Often Ineffective

Risk avoidance is often ineffective. In order for risk avoidance to work, advisories must be received and understood, restrictions must be monitored and enforced, and, ultimately, human behaviors must be changed. Even proponents of risk avoidance concede the considerable hurdles in each of these respects.

There is ample evidence that advisories and warnings often do not reach their intended audience. For example, a recent study showed that half of those consuming fish caught on the Great Lakes were unaware of the relevant fish consumption advisories.¹⁸⁵ Similarly, another study found that only 45% of those fishing the Newark Bay Complex were aware of the relevant fish and crab consumption advisories.¹⁸⁶ Notably, people of color, people with limited English proficiency, people with limited formal education, and low-income people tend to evidence the least awareness.¹⁸⁷

183. REGION 6, EPA, ASL, *supra* note 56, at 2–3.

184. *See, e.g.*, Anthony DePalma, *supra* note 129. “If ever there was unloved land, this is it, and for years the city was willing just to let it lie there. But Jersey City’s recent revival as a less expensive alternative to Manhattan has brought town house developments practically up to the edge of the chromium field.” *Id.*; Becky Kramer, *Silver Valley Yielding New Commodity: Homes; Historic Mining Area’s First Subdivision in Three Decades Piques Buyers’ Interest*, SPOKESMAN REV. (Spokane, Wash.), Apr. 30, 2005, at A1 (describing the increasing demand for real estate in the area surrounding the Bunker Hill Mining and Metallurgical Site after decades of inactivity, as a result of population growth and the demand for resort properties and second homes). *But compare* BREYER, *supra* note 125, at 12 (arguing that further risk reduction was unwarranted at a New Hampshire site, because children were not likely ever to come in contact with the contaminated soils there, for “future building seemed unlikely” given that the area was “a swamp”) *with* Finkel, *supra* note 130, at 314–15 (noting that “although Breyer concludes . . . that all such [risk] calculations were fanciful because the site was a swamp, it was in fact zoned for residential development” and a marsh occupied only a portion of the site).

185. John Tilden et al., *Health Advisories for Consumers of Great Lakes Sport-Fish: Is the Message Being Received?*, 105 ENVTL. HEALTH PERSP. 1360, 1363 (1997).

186. Joanna Burger, *Fish Consumption Advisories: Knowledge, Compliance and Why People Fish in an Urban Estuary*, 7 J. RISK RESEARCH 463, 469 (2004) (reporting results from a study of Newark Bay in which less than half of the respondents had heard about fish consumption advisories).

187. *See id.* at 469, 475 (finding that people of color, women, and those without a high school diploma evidenced the least awareness of fish consumption advisories); Dyan M. Steenport et al., *Fish*

Sometimes those who are most at risk are the least aware of advisories.¹⁸⁸ Even where those exposed are aware of the relevant advisories, it is often the case that they do not recall accurately or do not understand the content of the advisories.¹⁸⁹ For example, a recent survey in Oklahoma regarding ozone alerts found that whereas 73% of those surveyed could recall having heard about a “Clean Air Alert Day” the previous summer, only 50% of those surveyed knew what a “Clean Air Alert Day” indicated.¹⁹⁰

There is also evidence that restrictions on the use of contaminated sites and resources are often not implemented, monitored, or enforced. A recent study by the Government Accountability Office (GAO) of Superfund sites at which institutional controls were employed provides several examples.¹⁹¹ At one site, an institutional control prohibited any use of groundwater without prior written approval from EPA. However, in 2003, EPA discovered that over 25 million gallons of this water had been pumped for use as drinking water during 2002 and that this use may have been going on for some time during the previous five years as well.¹⁹² At another site, an institutional control required monitoring for worker safety precautions

Consumption Habits and Advisory Awareness Among Fox River Anglers, WIS. MED. J. 43, 44–45, Nov. 2000, available at <http://www.wisconsinmedicalsociety.org/uploads/wmj/steenport.pdf> (finding that 95% of anglers on the Fox River in Wisconsin who ate fish were unaware of Wisconsin’s fish advisory pamphlet and 50% of anglers who ate fish had not “heard about nor read about the health risks” of Fox River fish from any source. Of these, “Asians” (Hmong and Laotian individuals) represented 70% of those who had not heard about the health risks, although they represented only 19% of the total anglers surveyed). *But cf.* Hugh F. MacDonald & Kevin J. Boyle, *Effect of a Statewide Sport Fish Consumption Advisory on Open-Water Fishing in Maine*, 17 N. AM. J. OF FISHERIES MGMT. 687, 691 (1997) (finding that 63% of all anglers were aware of the mercury advisory covering fish from all lakes in Maine and finding no differences in awareness along the lines of gender, age, and “fishing effort,” but differences along the lines of education and income).

188. *See, e.g.*, Tilden et al., *supra* note 185, at 1360, 1363 (finding that fish consumption advisories do not effectively reach women, even though women are one of the target populations for advisories due to mercury contamination); Steenport et al., *supra* note 187 (finding that “Asian” anglers (primarily Hmong and Laotian anglers) were the least aware of the relevant advisories and that “White Bass, listed in the advisory as ‘Do Not Eat,’ appears to be their [species] of choice”).

189. *See, e.g.*, AUDREY CHANG, ASIAN PAC. ENVTL. NETWORK, A SEAFOOD CONSUMPTION SURVEY OF THE LAOTIAN COMMUNITY IN WEST CONTRA COSTA COUNTY, CALIFORNIA 29 (1998) (finding that 48.5% of respondents in the Laotian Community were aware of a consumption advisory for fish and shellfish in San Francisco Bay, but that only 59.5% of those aware could recall what the advisory said and none of those aware could recall the advisory’s recommendations with any more specificity than “pregnant women should not eat large amounts of Bay fish,” or “Bay fish are not safe to eat”).

190. Ass’n of Cent. Okla. Gov’ts, *Local Survey Shows Awareness of Ozone Alert Days*, June 2, 2003, available at http://www.acogok.org/Newsroom/View_News.asp?article=47 (percentages are rounded to the nearest whole percent).

191. GOV’T ACCOUNTABILITY OFFICE (GAO), HAZARDOUS WASTE SITES: IMPROVED EFFECTIVENESS OF CONTROLS AT SITES COULD BETTER PROTECT THE PUBLIC 17–35 (2005) (on file with GAO), available at <http://www.gao.gov/new.items/d05163.pdf>.

192. *Id.* at 29.

during any digging operations at the site. A GAO visit, however, revealed active digging about which the supervising EPA official for the site was unaware because he had not visited the site in four years.¹⁹³ At a third site, the GAO found “significant evidence of trespassing at the site,” but a steadfast refusal on the part of the responsible official to monitor the site.¹⁹⁴ Other sources similarly relate accounts of broken fences and breached prohibitions.¹⁹⁵ Advisories and warnings, too, may not be adequately maintained. Agency officials in New Jersey found that a sign advising against crabbing on the Hackensack River had fallen or been taken down and was being used, ironically, by a family who had placed it over a fire to support a cooking pot filled with river water and freshly caught crabs.¹⁹⁶ An agency review of the Agriculture Street Landfill site in New Orleans, discussed above, revealed that there were no provisions for forwarding to new property owners the instructions designed to ensure the integrity of engineering controls in the residential portion of the site (e.g., for handling and cultivating soils above the geotextile barrier).¹⁹⁷ And zoning restrictions or other proprietary controls may not be enforced.¹⁹⁸

Even if risk avoidance measures are completely effective in each of these two respects—they reach and are understood by their intended audiences and they are maintained in perpetuity—it is notoriously difficult to effect behavioral changes in people.¹⁹⁹ The perspective offered by one recreational angler from Wisconsin is illustrative: despite being aware of methylmercury contamination in the fish caught in local lakes, and despite having been advised personally by his physician to eliminate fish from his

193. *Id.* at 30.

194. *Id.* at 31–32.

195. See, e.g., Elizabeth Shogren, *Toxic-cleanup Money Running Dry*, SEATTLE TIMES, Aug. 5, 2002, at A5 (describing the site of the abandoned Chemical Insecticide Corp., located adjacent to suburban homes in Edison, New Jersey, which was contaminated with arsenic, lead, dioxin, and other chemicals: “On a recent afternoon, the back gate . . . was wide open. The only indication of the potential danger inside was a sign face down in the dirt that read: ‘Danger no trespassing; hazardous substances present.’”); see discussion *supra* notes 54–63 and accompanying text (describing ATSDR findings that, despite the fence around the “undeveloped” area of Agriculture Street Landfill, individuals continued to access the area, vehicles continued to be stored there, and the soil had been disturbed to a depth of up to six inches).

196. Kerry Kirk Pflugh, *Community Outreach to At-Risk Urban Anglers: A Case Study in Risk Communication of Fish Consumption Advisories*, NAT’L RISK COMM’N CONFERENCE II-32, II-35 (2001), available at <http://www.epa.gov/ost/fish/forum/riskconf.pdf>.

197. REGION 6, EPA, ASL, *supra* note 56, at 2.

198. See, e.g., Geisinger, *supra* note 47, at 386–93 (discussing limitations of regulatory, proprietary, and other institutional controls in proscribing future uses of contaminated lands).

199. See, e.g., Vincent T. Covello et al., *Risk Communication: A Review of the Literature*, 3 RISK ABSTRACTS 171, 174–75 (1986) (noting that behavioral changes are hampered, among other things, by individuals’ lack of motivation, reluctance to make the necessary tradeoffs, or fear and anxiety).

diet in order to reduce mercury levels in his blood, he concedes that he “can’t help himself” and so “now cheats a bit” and eats the fish he catches.²⁰⁰ Studies bear out this anecdotal account. According to one recent survey, of the 48.5% of respondents who were aware of the relevant fish consumption advisories for the San Francisco Bay, only 60.3% reported reducing their fish intake as a result.²⁰¹ Indeed, health and environmental agencies have emphasized the difficulty of getting risk-bearers to “comply” with fish consumption advisories by altering their preparation and consumption practices.²⁰² Similarly, people frequently do not comply with ozone alerts. Even those with a heightened interest often decline to change their ways. For example, only 56% of participants who voluntarily signed up to receive personal electronic notices of ozone alerts from the South Coast Air Quality Management District in the Los Angeles metropolitan area altered their behavior in accordance with the alerts they received.²⁰³

These hurdles, moreover, loom larger and may become insurmountable when those affected do not speak the language in which advisories are dispensed, do not have the economic wherewithal to alter their practices, or do not share the culture of the dominant population. Those who do not speak English may be missed entirely by warning signs posted only in English.²⁰⁴ Those with modest economic means may have few options for

200. *NOW: The Politics of Mercury* (PBS television broadcast June 25, 2004) (transcript available at http://www.pbs.org/now/printable/transcript326_full_print.html); see also Felicity Barringer, *New Hampshire Senate to Vote on Approach to Mercury Rule*, N.Y. TIMES, Mar. 24, 2005, at A14 (quoting a long-time fisher who indicated that he will continue to fish in local lakes and will “not cut back on his fish consumption” of two to three fish meals per week, despite advisories warning of mercury contamination in these waters).

201. See CHANG, *supra* note 189, at 29; accord Burger, *supra* note 186, at 475 (finding that, even in the face of laws forbidding catching and consuming crabs from the Newark Bay Complex, people continue to do so).

202. See, e.g., Pflugh, *supra* note 196, at II-33 (discussing challenges for New Jersey’s fish consumption advisory program, given the “large number of people who were not complying with the advisories” but “were still eating [fish], despite the issuing of advisories”); HENRY ANDERSON, NATIONAL RISK COMMUNICATION CONFERENCE II-36 (2001) (recounting efforts to evaluate the effectiveness of Wisconsin’s fish consumption advisories and finding “awareness” to be very high, but “compliance” to be lacking).

203. S. Coast Air Quality Mgmt. Dist., Board Meeting, *Pager Alert Pilot Survey*, att. 1 (Dec. 10, 1999), available at <http://www.aqmd.gov/hb/1999/991210a.html>.

204. See, e.g., NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 117–18 (discussing Oregon’s Bureau of Environmental Services’ efforts in assisting the City of Portland in translating a fish advisory brochure into six foreign languages). Note that even advisories issued in multiple languages may nonetheless miss large numbers of anglers due to language barriers. See, e.g., LAOTIAN ORGANIZING PROJECT, FIGHTING FIRE WITH FIRE 5 (2001) (indicating dismay at the fact that a state fish consumption advisory posted in a popular fishing spot in Richmond, California was written only in English, Spanish, and Vietnamese: “The Vietnamese language translation is useless to a predominantly Laotian population.”).

risk avoidance: it may be wholly impractical to fish “elsewhere” if all of the rivers, lakes, and bayous nearby are contaminated and one does not own a car or have the money for gas;²⁰⁵ it may be unrealistic to stay inside on “ozone alert” days if one’s livelihood depends on working outdoors. And those for whom fish consumption includes spiritual, traditional, or cultural dimensions may be deeply resistant to altering their practices. Indeed, they may feel that it is simply not possible to change their preparation methods, to cease eating particular species, or to move from their customary fishing places.²⁰⁶ This is likely the case, for example, for members of the various Ojibwe tribes. A recent survey conducted by the Great Lakes Indian Fish and Wildlife Commission showed that whereas 57% of tribal fishers were aware of mercury advisories for walleye—an important species for tribal fishers and their families—only 9% had ever refused to eat walleye in a group setting such as a feast or a ceremonial gathering.²⁰⁷ This is also likely the case for members of the fishing tribes in the Pacific Northwest. As the Columbia River Inter-Tribal Fish Commission explains: “Salmon and the rivers they use are a part of our sense of place. The Creator put us here where the salmon return. We are obliged to remain and to protect this place.”²⁰⁸ Moreover, various tribes’ aboriginal and treaty-based claims to the fish and other resources are tied to specific places; the legal protections that flow from these claims cannot simply be re-established somewhere else.²⁰⁹ As well, the particularized skills and ecological knowledge that these peoples have developed over generations are place specific and, therefore, not transferable to other locations.

4. Risk Avoidance Has Finite Possibilities

Risk avoidance is an approach with diminishing and, ultimately, finite possibilities. Once contaminants are introduced or permitted to remain in the environment, there may be few options—perhaps even no options—for avoiding contact with them. The options that do exist, moreover, are likely

205. See NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 91–93 (quoting fishers along the Columbia Slough in Oregon and the Detroit River in Michigan).

206. *Id.* at 91–93.

207. GREAT LAKES INDIAN FISH & WILDLIFE COMM’N, 1993 SURVEY OF TRIBAL SPEARERS, att. 2, at 1, 5 (1993); see also Sue Erickson, 2004 Treaty Spearing and Netting Season Fast and Furious, MAZINA’IGAN: A CHRONICLE OF THE LAKE SUPERIOR OJIBWE, Summer 2004, at 1, available at <http://www.glifwc.org/pub/mazinaigan/Summer2004.pdf> (discussing the importance of walleye, muskellunge, northern pike, and lake trout to tribal fishers and their families).

208. Columbia River Inter-Tribal Fish Comm’n, *The Importance of Salmon to the Tribes*, available at <http://www.critfc.org/text/salmcult.html> (last visited Nov. 13, 2006).

209. *Lac Courte Oreilles Band of Lake Superior Chippewa Indians v. Wisconsin*, 653 F. Supp. 1420, 1422 (W.D. Wis. 1987); *United States v. Washington*, 384 F. Supp. 312, 401 (W.D. Wash. 1974).

to diminish over time, as uncontaminated environments are permitted one by one to become and remain degraded. Ultimately, heavy reliance on risk avoidance in lieu of risk reduction would leave no healthful alternatives.

The options for risk avoidance may be few. Some pollutants can be more readily avoided than others, and some resources can be more readily replaced by surrogates. For example, a fisher seeking to avoid PCB contamination might be able to alter his preparation methods (trimming the skin and fat from fillets and broiling or grilling so that the fat drips off while cooking)—but to continue to fish at his customary sites and for his customary species.²¹⁰ A fisher seeking to avoid mercury contamination, by contrast, cannot do so merely by altering her preparation methods, because methylmercury accumulates in the muscle tissue that comprises the fillet.²¹¹ Instead, she must take steps to reduce her total consumption of particular species caught from contaminated waters and to pace her allowable intake to avoid acute exposure. In some cases, she may need to eliminate her consumption altogether.

Further, the more risk avoidance is allowed to supplant risk reduction, the fewer the options for risk avoidance. To the extent that advisories redirect consumption to less contaminated fish species,²¹² to smaller fish of contaminated species,²¹³ or to other sources of protein, these alternative species and resources may become overburdened and systematically tapped out. To the extent that frequent ozone alerts prompt Southern Californians to move out of the city, air pollution may be increased in the surrounding suburbs as a result of these individuals' longer commutes.²¹⁴ Ultimately, heavy reliance on risk avoidance would lead to a world in which there are no longer any healthful alternatives, as uncontaminated environments are permitted one by one to become and remain degraded. Eventually, if

210. PCBs are lipophilic and thus accumulate in a fish's fatty tissue. See, e.g., EPA, PCBs UPDATE, *supra* note 8, at 1, 4. Even the relatively expansive options for avoiding PCBs in fish may be inappropriate from the perspective of some groups. The suggestion that preparation and cooking methods be altered may be perceived as a cultural affront and may be resisted. See generally NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 90–127.

211. EPA, MERCURY UPDATE, *supra* note 7, at 2.

212. See, e.g., EPA, MERCURY ADVISORY FOR WOMEN AND CHILDREN, *supra* note 16 (directing those at risk to eat up to twelve ounces per week of the following fish, which are low in mercury: "shrimp, canned light tuna, salmon, pollock and catfish").

213. See, e.g., WIS. DEP'T OF NATURAL RES., HOOK INTO HEALTHY FISH!, available at <http://www.dnr.wi.gov/org/water/fhp/fish/pages/consumption/hookintohealthyfish06.pdf>; CHOOSE WISELY: A HEALTH GUIDE FOR EATING FISH IN WISCONSIN, available at <http://www.dnr.wi.gov/org/water/fhp/fish/pages/consumption/Fish%20Advisory%2006%20web%20lo.pdf> (advising women of childbearing age and children under the age of fifteen not to consume any walleye larger than a certain size from particular Wisconsin waters, e.g., no larger than seventeen inches from English Lake and no larger than twenty inches from Siskiwit Lake).

214. CAL. AIR RES. BD., *supra* note 112, at 281.

mercury emissions were to continue unabated, there would be no “safe” species of fish and no lakes free of contamination. If C8 (perflourooctanoic acid and its salts) were to remain untreated in every aquifer, there would be no water left to bottle.²¹⁵

5. Risk Avoidance May Itself Introduce Risks

Risk avoidance may itself introduce risks. If those exposed change their ways in order to avoid risks posed by contamination, they may adopt practices that subject them to a different set of risks. To the extent that asthmatic children heed warnings to avoid sports and other activities outdoors on “ozone alert” days, for example, they may face an increased risk of obesity and other ills that attend a more sedentary lifestyle.²¹⁶ To the extent that those affected “comply” with fish consumption advisories, the potential for countervailing risks is a serious concern. The nutritional benefits of frequent fish consumption are well known: fish are an efficient source of protein, omega-3 fatty acids, selenium, and other nutrients important to human health.²¹⁷ For example, frequent fish consumption is associated with a lower risk of stroke,²¹⁸ a lower risk of Alzheimer disease,²¹⁹ and, most recently, a decreased rate of cognitive decline with age.²²⁰ By foregoing fish consumption, people may open themselves to an

215. See *Bottled Water Mandated by Suit Is Tainted*, WASH. POST, Jan. 13, 2006, at A9 (describing an instance in which bottled water provided by DuPont as part of a settlement was contaminated with trace amounts of the same chemical, C8 (perflourooctanoic acid and its salts), that had contaminated the wells that were the subject of the lawsuit; DuPont agreed to provide bottled water to some 1000 residents until it installs filters at water treatment plants to remove the C8).

216. CAL. AIR RES. BD., *supra* note 112, at 280.

217. See, e.g., Renate D. Kimbrough, *Consumption of Fish: Benefits and Perceived Risk*, 33 J. TOXICOLOGY & ENVTL. HEALTH 81, 82–83 (1991) (stating that fish generally offer definite health benefits, such as providing a good source of protein, while containing less saturated fats and cholesterol than other sources of food).

218. See, e.g., Richard F. Gillum et al., *The Relationship Between Fish Consumption and Stroke Incidence: The NHANES I Epidemiologic Follow-Up Study*, 156 ARCHIVES OF INTERNAL MED. 537, 542 (1996) (finding a lower incidence of stroke in women who consumed fish more than once a week than in those who never ate fish); Hiroyasu Iso et al., *Intake of Fish and Omega-3 Fatty Acids and Risk of Stroke in Women*, 285 J. AM. MED. ASS'N 304, 311 (2001) (examining the relationship between consumption of fish and omega-3 fatty acids and reduced risk of stroke in women); Sirving O. Keli et al., *Fish Consumption and Risk of Stroke: The Zutphen Study*, 25 STROKE 328, 331 (1994) (finding an association between incidence of strokes and consuming at least one portion of fish weekly). *But see* Anthony J. Orencia et al., *Fish Consumption and Stroke in Men: 30-year Findings of the Chicago Western Electric Study*, 27 STROKE 204, 208 (1996) (showing “no significant relationship” between fish consumption and a reduced stroke risk).

219. See, e.g., Martha Clare Morris et al., *Consumption of Fish and N-3 Fatty Acids and Risk of Incident Alzheimer Disease*, 60 ARCH. NEUROL. 940, 944 (2003) (finding a correlation between fish consumption and a decrease in the risk of Alzheimer disease).

220. Martha Clare Morris et al., *Fish Consumption and Cognitive Decline with Age in a Large*

increased risk of these and other adverse health effects. Dietary substitutes for fish, moreover, may be less nutritious or may introduce their own health risks. For example, a recent study found a link between regular consumption of red meat and an increased risk of breast cancer in women.²²¹ In addition, for people who consume fish as part of a traditional diet, such as those in the fishing tribes of the Pacific Northwest, the upper Great Lakes, and elsewhere, regular consumption of fish and other traditional foods may promote health and combat diabetes. Diabetes is a particular concern for tribes given that the incidence of diabetes is “two to three times as high among [American Indians and Alaska Natives] than among all racial/ethnic populations combined.”²²² One recent study observes, “[t]he loss of traditional food sources is now recognized as being directly responsible for a host of diet-related illnesses among Native Americans, including diabetes, obesity, heart disease, tuberculosis, hypertension, kidney troubles, and strokes.”²²³ Agencies may believe themselves to have made informed choices and tradeoffs before opting for risk avoidance. However, agency decision makers may not foresee fully the roster of countervailing risks introduced by avoidance measures.

6. Risk Avoidance Discourages Diversity of Lifeways

Risk avoidance may discourage plural and diverse lifeways. Risk avoidance measures may call upon risk-bearers to forego an array of practices or pursuits—from frying fish caught in the Detroit River,²²⁴ to breastfeeding their infants, to spearing walleye, to allowing their children to play outdoors in the summer, to giving their babies clams on which to teethe.²²⁵ If risk-bearers are faced with engaging in these activities only at the risk of exposure to unhealthy levels of environmental contaminants,

Community Study, 62 ARCHIVES OF NEUROLOGY 1849, 1851 (2005).

221. Eunyoung Cho et al., *Red Meat Intake and Risk of Breast Cancer in Premenopausal Women*, 166 ARCHIVES OF INTERNAL MED. 2253 (2006).

222. Ctrs. for Disease Control & Prevention, *Health Disparities Experienced by American Indians and Alaska Natives*, 52 MORBIDITY & MORTALITY WKLY. REP. 697, 697 (2003), available at <http://www.cdc.gov/mmwr/pdf/wk/mm5230.pdf>.

223. KARI MARIE NORGAARD, THE EFFECTS OF ALTERED DIET ON THE HEALTH OF THE KARUK PEOPLE: A PRELIMINARY REPORT 1, 5, 27 (2004), available at <http://friendsoftheriver.org/PressRoom/PDF/HealthEffectsOfAlteredDiet.pdf> (citation omitted) (documenting the dramatic shift in diet of the Karuk people since European contact due to denied access to and diminished quality and quantity of a significant percentage of their traditional foods, including salmon and noting the resulting high incidence of diabetes—at 12%, nearly twice the national average—and of heart disease—at 39.6%, nearly three times the national average—among the Karuk).

224. NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 96 (summarizing a study concluding that frying fish is a tradition in African American communities).

225. *Id.* at 35.

few may feel they can continue to do so.²²⁶ Over time, the practices may fall into disuse, the lifeways may die out. A shift to risk avoidance is likely to have a chilling effect in particular on “outlier” practices—those thought by the dominant or majority population not to be valuable, natural, or necessary. However, this is not always the case, as avoidance measures sometimes touch more mainstream practices—particularly if avoidance will fall primarily to subpopulations who are few in number, politically disempowered, or are historically discriminated against. And, to the extent that decision makers rely increasingly on risk avoidance, it may be that more and more practices and pursuits get restricted or prohibited entirely. In any event, considerable losses attend a loss of diversity, impacting the practitioners themselves, the ethnocultural groups of which they are a part, and society as a whole.

The value of diversity in numerous public and private spheres is well recognized.²²⁷ Ensuring the flourishing of plural and diverse lifeways is justified on both instrumental and intrinsic grounds. When we as a society encourage diversity in this context, we decline to commit to a single course of action. We thereby enhance the chances of identifying innovative or optimal alternatives in the face of social challenges. Conversely, we guard against errors in predicting which practices or lifeways are likely to succeed and which are to fail. This function becomes especially important where there are “gaps in society’s understanding of cause[s] and effect[s],”²²⁸ as is the case with much of the science underlying environmental issues. When we as a society encourage diversity here we also uphold normative commitments to cultural self-determination and the flourishing of multiple cultures. Some practices may be central to the cultural identity of particular groups. As elaborated below, fish, fishing, and fish consumption define who the various Ojibwe and other Great Lakes tribes and bands are *as peoples*.²²⁹ Members of any cultural group, whether in the minority or majority, have a right to society’s respect for the integrity of their culture.

226. This may be the case, for example, when women learn that their breast milk contains chemical contaminants, which may be passed on to their nursing babies. See, e.g., Lisa Heinzerling, *Risking It All*, 57 ALA. L. REV. 103, 104 (2005).

Nursing mothers in many parts of the world have disturbingly high concentrations of industrial chemicals in their breast milk. . . . Some scientists have hypothesized that one reason why women who breastfeed their children have a lower risk of cancer is that they have (unwittingly) dumped some of their chemical load into their own babies’ bodies.

Id.

227. David Orentlicher, *Diversity: A Fundamental American Principle*, 70 MO. L. REV. 777, 781 (2005) (addressing the benefits and importance of diversity in “public and private spheres”).

228. *Id.*

229. See discussion *infra* note 236 and accompanying text.

However, because society is more likely to breach this right with regard to cultural groups in the numerical minority or in an otherwise non-dominant position, particular vigilance is warranted in this case. This is especially so where there have been historical efforts to assimilate the group and denigrate its culture.²³⁰ Finally, when we encourage diversity of practices and lifeways, we evince esteem for—and delight in—diversity for its own sake. Although a particular practice may not ultimately serve any useful end and may not feature prominently in any group's understanding of itself as a culture or a people, the practice may nonetheless be one among a multitude of human ways—and we, as a society, might value the existence of this multitude.²³¹

7. Risk Avoidance Is Unjust

Risk avoidance is often unjust. The burden of undertaking risk avoidance measures is likely to fall disproportionately on tribes and indigenous peoples, other communities of color, and low-income communities. This is so because members of these groups are likely to be among the most exposed to environmental contaminants.²³² These individuals are more likely to live near multiple sources of air pollution, thereby inhaling relatively greater doses and mixes of hazardous air pollutants;²³³ they are more likely to live within or near Superfund sites,

230. See, e.g., S. James Anaya, *Ethnic Group Rights*, in *ETHNICITY AND GROUP RIGHTS NOMOS XXXIX*, 222, 228–29 (Ian Shapiro & Will Kymlicka eds., 1997); see also O'Neill, *Variable Justice*, *supra* note 109, at 94–98.

231. Consider the following example. One commentator decries the effect of Wal-Mart's extraordinary buying power on the diversity of offerings at grocery stores: because Wal-Mart carries only the top two national brands in any category, and because food producers have responded in many cases by eliminating the items that do not make this cut, "the seventh brand of mustard"—along with an array of choices along multiple dimensions—may simply become unavailable. Nina Teicholz, *The World According to Sam*, *GOURMET* 100, 108 (June 2005).

232. Although this claim is not uncontested, it is fair to say that it is, on balance, supported by the weight of the evidence. For useful catalogs and syntheses of the relevant studies, see LUKE W. COLE & SHEILA R. FOSTER, *FROM THE GROUND UP: ENVIRONMENTAL RACISM AND THE RISE OF THE ENVIRONMENTAL JUSTICE MOVEMENT* 54, app. at 167 (Richard Delgado & Jean Stefancic eds., New York University Press 2001); CLIFFORD RECHTSCHAFFEN & EILEEN GAUNA, *ENVIRONMENTAL JUSTICE: LAW, POLICY AND REGULATION* 55 (2002).

233. See, e.g., COMM'N FOR RACIAL JUSTICE, UNITED CHURCH OF CHRIST, *FROM PLANTATIONS TO PLANTS: REPORT OF THE EMERGENCY NATIONAL COMMISSION ON ENVIRONMENTAL AND ECONOMIC JUSTICE IN ST. JAMES PARISH, LOUISIANA Tbls. I & II* (Charles Lee & Damu Smith coordinators, Sept. 15, 1998) (comparing toxic air pollutant releases in St. James Parish with the United States average and noting that annual releases in St. James Parish were 30,560 pounds per square mile and 360 pounds per person, whereas releases in the United States were only 382 pounds per square mile and seven pounds per person), available at http://www.ejrc.cau.edu/convent_report.html.

coming in contact with contaminated soils;²³⁴ and they are likely to consume fish in larger quantities, at greater frequencies, and in accordance with different practices, ingesting greater doses of mercury, PCBs, dioxins, and other contaminants.²³⁵

This general observation is borne out in the examples of risk avoidance canvassed above. Whereas members of the general population, especially those who do not consume fish, are not much affected by a turn to advisories in lieu of reduced mercury contamination, members of the Ojibwe tribes and other fishing peoples will be asked to “choose” between curtailing severely their fish intake or being exposed to methylmercury in the fish they eat at levels determined to be unsafe for humans.²³⁶ Members of these tribes consume fish in greater quantities, at higher frequencies, and in accordance with different seasonal cycles and cultural constraints than members of the general population.²³⁷ Members of these tribes also tend to consume different species and obtain their fish from different sources than “the typical U.S. consumer eating a variety of fish from restaurants and grocery stores”²³⁸ that is assumed by the EPA. According to studies documenting fish consumption practices, relevant fish consumption rates include 17.5 grams per day for members of the general U.S. population and 189.6 grams per day for fish consumers in the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) member tribes.²³⁹ Consequently, whereas a woman consuming walleye at rates typical of the general U.S. population will be exposed to methylmercury just at the EPA’s current reference dose, a woman consuming at rates typical of the GLIFWC member tribes will be exposed to methylmercury at levels more than ten times the EPA’s reference dose.²⁴⁰ The Clean Air Mercury Rule delays and diminishes regulatory efforts to address this status quo, relying instead on fish consumption advisories. Somewhat remarkably, the EPA unflinchingly

234. See, e.g., JAMES T. HAMILTON & W. KIP VISCUSI, *CALCULATING RISKS? THE SPATIAL AND POLITICAL DIMENSIONS OF HAZARDOUS WASTE POLICY* 165 (1999). While nonwhites account for 24.2% of the U.S. population, they account for 35.1% of the population living within the boundaries of the 1,173 NPL sites studied and 28.9% of the population living within four miles of these sites, “indicating that these groups bear more of the potential exposures from Superfund sites.” *Id.*

235. See, e.g., NEJAC FISH CONSUMPTION REPORT, *supra* note 103.

236. O’Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,110.

237. *Id.* at 11,075–79.

238. Proposed National Emissions Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam-Generating Units; Proposed Rule, 69 Fed. Reg. 4652, 4685 (proposed Jan. 30, 2004) (to be codified at 40 C.F.R. pts. 60, 63). This “typical U.S. consumer,” EPA assures, “is not in danger of consuming harmful levels of methylmercury from fish and is not advised to limit fish consumption.” *Id.*

239. O’Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,093.

240. *Id.*

acknowledges that it will be “Native Americans, Southeast Asian Americans, and lower income subsistence fishers” who will be subject to these avoidance measures.²⁴¹

Similarly, Oregon’s decision to adopt water quality standards based on the national default fish consumption rate of 17.5 grams per day vastly understates consumption by members of the Umatilla and other fishing tribes. Surveys of contemporary consumption by members of the Columbia River Basin tribes have documented fish intake of 97.2–130 grams per day at the 90th percentile, 389 grams per day at the 99th percentile, and 972 grams per day as a maximum value.²⁴² Surveys of contemporary consumption by tribal elders and traditional and subsistence fishers in the Confederated Tribes of the Umatilla Indian Reservation have documented an average fish intake of 540 grams per day.²⁴³ Moreover, these contemporary consumption rates represent consumption that is “suppressed” from treaty-protected levels—levels that tribal members once did, and are still entitled to, consume.²⁴⁴ Those tribal members who consume the greatest quantities of fish are the most exposed to the host of contaminants regulated by reference to ODEQ’s water quality standards.

The Agriculture Street Landfill is located in a New Orleans neighborhood that is 98% African American.²⁴⁵ It is known as “The Black Love Canal.”²⁴⁶ There is evidence that, beginning in 1969, federal and local governments encouraged low- and middle-income African Americans to populate the residential neighborhoods that, unbeknownst to these residents, were constructed on top of the former landfill.²⁴⁷ When the contamination came to light, these residents met with initial agency reticence to cleanup under CERCLA, finally succeeding in 1994 to get the site placed on the

241. Proposed National Emissions Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam-Generating Units; Proposed Rule, 69 Fed. Reg. at 4709.

242. See O’Neill, *Variable Justice*, *supra* note 109, at 52, tbl.1; CRITFC, *supra* note 35.

243. Harris & Harper, *A Native American Exposure Scenario*, *supra* note 35, at 791.

244. See, e.g., O’Neill, *Protecting the Tribal Harvest*, *supra* note 41; STUART G. HARRIS & BARBARA L. HARPER, *CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION, EXPOSURE SCENARIO FOR CTUIR TRADITIONAL SUBSISTENCE LIFEWAYS* (2004), available at <http://www.hhs.oregonstate.edu/ph/tribal-grant/CTUIR-Scenario.doc> (contending that the relevant baseline for treaty-protected rights to fish is the level of tribal fish consumption at the time of the treaty’s signing in 1855).

245. AGENCY FOR TOXIC SUBSTANCES DISEASE REGISTRY, *supra* note 176, at 3 (citing 2000 census data).

246. MEMBER SCHOLARS OF THE CTR. FOR PROGRESSIVE REFORM, CTR. FOR PROGRESSIVE REFORM (CPR), CPR PUB. NO. 512, *AN UNNATURAL DISASTER: THE AFTERMATH OF HURRICANE KATRINA 20* (2005), available at http://www.progressivereform.org/Unnatural_Disaster_512.pdf.

247. *Id.* at 20, 47 n.84.

National Priorities List.²⁴⁸

At the Bunker Hill Mining and Metallurgical Site in Coeur d'Alene, more than 7000 people reside within the site boundaries, approximately 30% of whom live below the poverty line.²⁴⁹ In addition, members of the Coeur d'Alene Tribe are among the most exposed, given that their traditional cultural practices include subsistence, medicinal, and ceremonial uses of resources contaminated by mining activities at the site.²⁵⁰ According to the Human Health Risk Assessment,

it is clear that a subsistence-based lifestyle requires environmental lead levels orders of magnitude lower than those measured throughout the floodplain of the Coeur d'Alene River. . . . Predictions for [blood lead levels] associated with subsistence activities . . . would significantly exceed all health criteria for children or adults.²⁵¹

More generally, a prominent study has shown that less protective cleanup methods, such as capping, comprise the preferred remedy 7% more frequently at sites in predominantly non-white communities than in predominantly white communities.²⁵² Conversely, treatment constitutes the preferred remedy 22% more often at sites in predominantly white communities than in predominantly non-white communities.²⁵³ As well, cleanup efforts were significantly delayed in predominantly non-white communities—commencing 12% to 42% later than in predominantly white communities.²⁵⁴ And although data are sparse, it may be that institutional controls are being employed more often in non-white communities than in white communities.²⁵⁵

Additionally, African Americans and Hispanics are more likely than their white counterparts to live in counties in which one or more national

248. *Id.* at 20.

249. REGION 10, EPA, BUNKER HILL SITE DESCRIPTION, *supra* note 65, at 8, 13.

250. NAT'L RES. COUNCIL, SUPERFUND AND MINING MEGASITES, *supra* note 66, at 179–80.

251. *Id.* (quoting Terra Graphics et al., Human Health Risk Assessment, 6-2, 6-51 (2001)).

252. *See, e.g.*, Marcia Coyle et al., *Unequal Protection: The Racial Divide in Environmental Law*, NAT'L. L. J., Sept. 21, 1992, at S1–S12. Note that this study has been criticized. Subsequent studies of the same or similar cases have variously confirmed or refuted its conclusions. For discussion, see EILEEN GAUNA ET AL., CTR. FOR PROGRESSIVE REFORM, ENVIRONMENTAL JUSTICE 4–5, 7–8 (2005), available at http://www.progressivereform.org/articles/ej_505.pdf.

253. *Id.* at 7.

254. *Id.*

255. *See* Erwin Tam, Analysis of Institutional Controls at California Superfund Sites (unpublished paper, available electronically at http://ist_socrates.berkeley.edu/~es196/projects/2000final/tam.pdf) (finding unfair implementation of institutional controls within California).

ambient air quality standard is exceeded.²⁵⁶ African Americans are sent to the emergency room because of asthma at five times the rate of whites; they are hospitalized for asthma treatment at three times the rate of whites; and they die from asthma at twice the rate of whites.²⁵⁷

Moreover, risk avoidance measures are likely to be evaluated by reference to the understandings and commitments of the dominant society and adopted only where avoidance is thought not to occasion great costs or profound loss.²⁵⁸ Yet, the understandings and commitments of those who will be faced with altering their practices and lifeways may be quite different than those of the dominant society. This will often be the case where Native peoples are prominent among the risk-bearers and may also be the case when other non-dominant groups are at risk. Thus, environmental injustice here arises not only from distributive inequities but also from cultural discrimination. For example, not only are the Ojibwe and other fishing peoples the ones most heavily burdened by reliance on fish consumption advisories, but they are also likely to understand differently the nature of this burden than do members of the dominant society.²⁵⁹ For the fishing tribes of the Great Lakes, as for fishing peoples elsewhere, fish, fishing, and fish consumption are central to their identity as peoples. Fish and the lifeways associated with fish are indispensable to these peoples' physical, social, economic, political, spiritual, and cultural health.²⁶⁰ For the dominant society, by contrast, these practices may be valued for a variety of reasons, but they are likely thought expendable. Thus, for example, a woman in the general population who habitually consumes two meals of fish per week might, when faced with fish consumption advisories for mercury, look to substitute food sources with relatively modest accommodations to palate and pocketbook. A woman in the Mille Lacs Band, however, might view such risk avoidance measures as *impossible*, given the affront this would mean to her tribe's very identity, to what it means to *be* Ojibweg.²⁶¹ By permitting significant mercury contamination to remain and relying instead on fish consumption

256. See, e.g., BLACK LEADERSHIP FORUM ET AL., AIR OF INJUSTICE: AFRICAN AMERICANS & POWER PLANT POLLUTION 3 (2002) (noting that "71% of African Americans live in counties that violate[d] federal air pollution standards [in 2002], compared to 58% of the white population"); LEAGUE OF UNITED LATIN AM. CITIZENS, AIR OF INJUSTICE: HOW AIR POLLUTION AFFECTS THE HEALTH OF HISPANICS AND LATINOS 3 (2004) (noting that 71% of Hispanics live in counties that violated federal air pollution standards in 2002).

257. AM. LUNG ASS'N, MINORITY LUNG DISEASE DATA 2000, at 4 (2000). See generally BLACK LEADERSHIP FORUM ET AL., *supra* note 256, at 3.

258. See O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13.

259. O'Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,110.

260. *Id.*

261. *Id.*

advisories, EPA perpetuates a long history of cultural discrimination against American Indian peoples.²⁶²

Finally, any cost savings generated by a shift to risk avoidance will be enjoyed primarily by the sources that produce contaminants and not the people who are exposed to them in the environment. This fact—that the societal winners are not actually required to compensate the societal losers—is often glossed over by those touting the cost savings or efficiency gains of this and similar moves away from risk reduction. Such cost savings are defended because they make “society” better off—they are efficient according to the Kaldor-Hicks (or “potential Pareto”) criterion.²⁶³ By this test, an outcome is deemed efficient if the net (monetized) benefits are increased, that is, if the winners will gain more than the losers will lose (such that they could, in theory, compensate the losers). However, as Amartya Sen has observed, this criterion would permit decisions that make the rich richer and the poor poorer: “the *potential* for improvement in Pareto’s terms—the fact that compensation *could* have been paid so that the poor didn’t become poorer—does not justify the *reality* of increased poverty.”²⁶⁴

C. On Balance

Of course, the case for risk avoidance must be considered in view of the case against it and vice versa. Several of the arguments on either side should be qualified or modified as a result. This section explores how the various claims fare, on balance.

1. Considerable Cost Savings—By a Partial Accounting

The case for risk avoidance is supported by an important and enticing claim. Risk avoidance measures can provide “the same amount of human health protection” at a much lower cost than the relevant risk reduction strategies. Can risk avoidance deliver on this promise? As noted above, the cost savings are potentially quite large. This claim, therefore, deserves serious attention. Much social good could be accomplished with an extra

262. See, e.g., Anaya, *supra* note 230, at 228–29 (recounting the history of cultural discrimination in what is now the United States).

263. Nicholas Kaldor, *Welfare Propositions in Economics and Interpersonal Comparisons of Utility*, 49 *ECON. J.* 549 (1939); J.R. Hicks, *The Foundations of Welfare Economics*, 49 *ECON. J.* 696 (1939).

264. ACKERMAN & HEINZERLING, *supra* note 135, at 35 (citing Amartya Sen); see also Amartya Sen, *The Discipline of Cost-Benefit Analysis*, 29 *J. LEGAL STUD.* 931, 947–48 (2000) (discussing reality of loss for societal “losers” in the absence of compensation).

\$100 million. However, the figures cited tend to be based on a partial accounting.

Where cost data exist, they are especially incomplete. Efforts to estimate the costs of institutional controls, for example, have to date failed adequately to incorporate the costs of implementing, monitoring, reporting, and enforcing over the entire life of the institutional control—a period that could last decades, if not in perpetuity.²⁶⁵ In fact, as EPA has itself acknowledged, “once the total life-cycle costs of implementing, monitoring and enforcing an [institutional control]—which may exceed 30 years—are fully calculated, it may actually be less costly in the long term to implement a remedy that requires treatment of the waste.”²⁶⁶ Note, too, that cost data here tend to be incomplete in asymmetric ways: the costs of engineering controls are more fully characterized and more readily quantified than the costs of institutional controls.²⁶⁷ As well, such tallies tend to neglect the economic benefits of prevention, reduction, or cleanup.²⁶⁸ At the Bunker Hill Mining and Metallurgical Site, for example, cleanup activities are estimated to have contributed \$77.4 million to the state and local economy as of 2003.²⁶⁹

Moreover, the proponents’ claim is actually a narrow one and should be stated more precisely: risk avoidance can provide the same amount of human health protection from a target risk due to the direct mechanism of environmental fate, transport, and exposure contemplated by the particular avoidance measure. That is to say, if one adds to the ledger the costs of addressing the adverse human health effects due to (1) indirect mechanisms; (2) human health endpoints other than the target risk; and (3) introduced risks, the costs of obtaining the “same amount of human health protection” would be greatly increased.

Estimates of cost savings would need to be reduced to account for risk

265. E-mail from Michael Bellot, Director, Institutional Controls Program, EPA to author (Aug. 31, 2005), *supra* note 103; Telephone Interview with Michael Bellot, Director, Institutional Controls Program, EPA (June 17, 2005). As noted above, EPA is in the process of improving its ability to estimate institutional control costs, and, among other things, has enlisted contractors to assist in this effort. *See, e.g.,* JOHN PENDERGRASS & KATHLEEN PROBST, ESTIMATING THE COST OF INSTITUTIONAL CONTROLS 9–10 (2005), available at <http://www.rff.org/documents/RFF-Report-costs.pdf> (noting EPA’s recommendation to evaluate costs for institutional controls).

266. U.S. ENVTL. PROT. AGENCY, INSTITUTIONAL CONTROLS: A SITE MANAGER’S GUIDE TO IDENTIFYING, EVALUATING AND SELECTING INSTITUTIONAL CONTROLS AT SUPERFUND AND RCRA CORRECTIVE ACTION CLEANUPS 8 (2000).

267. *See, e.g.,* Heinzerling, *Risking It All*, *supra* note 226, at 113 (arguing that cost-benefit analyses “skew against environmental protection” because benefits such as “human lives saved, human illnesses averted, and ecological harms” are difficult to quantify).

268. *Id.*

269. U.S. ENVTL. PROT. AGENCY, SUPERFUND FACT SHEET: BUNKER HILL “BOX” 2 (2003), available at <http://yosemite.epa.gov/R10/CLEANUP.NSF> (follow “Bunker Hill ‘The Box’” hyperlink).

avoidance's failure to address indirect human health effects. As noted above, contaminants introduced or allowed to remain in the environment may indirectly affect human health: they may deplete the resources on which humans depend, or they may migrate or otherwise behave in ways not predicted, eventually exposing humans to risk. Even some proponents have acknowledged that the beneficiaries of risk avoidance will be limited to the current generation, for example, touting the cost savings of institutional controls "at least in the short run."²⁷⁰ John Pendergrass has suggested that institutional controls may ultimately fail—and so require sites to be reopened in the future for further cleanup—at as many as 100% of non-National Priorities List sites that have not achieved unrestricted use standards.²⁷¹ In some instances, moreover, it may be that costs are not only deferred but ultimately increased, as future generations are left to deal with a pollution problem made worse by time and inattention.

Estimates of cost savings would also need to be reduced to account for risk avoidance's failure to address non-target risks. As discussed above, health endpoints other than those targeted by risk avoidance measures may adversely affect human health. Gayer and Hahn's estimate of the cost savings from less protective mercury regulations,²⁷² for example, would need to be reduced considerably if methylmercury's adverse effects on adult cardiovascular systems were also accounted for.²⁷³ Indeed, as Samuel Rascoff and Richard Revesz have documented, risk reduction measures often have ancillary benefits: because they reduce contamination at the source, they reduce all of the consequent human health risks—including risks from endpoints other than those specifically targeted.²⁷⁴

270. Daniel S. Miller, *Looking a Gift Horse in the Mouth: Federal Agency Opposition to State Institutional Control Laws*, 32 *Env'tl. L. Rep.* (Env'tl. Law Inst.) 11,115, 11,115 (Sept. 2002).

271. John Pendergrass, *Institutional Controls in the States: What Is and Can Be Done to Protect Public Health at Brownfields*, 35 *CONN. L. REV.* 1303, 1312 (2003).

272. See Gayer & Hahn, *supra* note 132, at 28 (estimating the costs and benefits of mercury regulation).

273. The Harvard Center for Risk Analysis, for example, assessed the human health benefits of mercury emissions reductions under various proposals for regulating coal-fired utilities. In addition to finding potential benefits to children from reduced neurological damage ranging between \$75 million to \$119 million annually, it found potential benefits to adult males from reduced cardiovascular disease ranging from \$3.3 billion to \$4.9 billion annually. GLENN RICE & JAMES K. HAMMITT, HARVARD CTR. FOR RISK ANALYSIS, *ECONOMIC VALUATION OF HUMAN HEALTH BENEFITS OF CONTROLLING MERCURY EMISSIONS FROM U.S. COAL-FIRED PLANTS xvii-xviii* (2005), available at <http://bronze.nescaum.org/airtopics/mercury/rpt050315mercuryhealth.pdf>. For a discussion of this and other issues surrounding the estimates of costs and benefits of regulating mercury from coal-fired utilities, see RENA I. STEINZOR, *MOTHER EARTH AND UNCLE SAM: HOW POLLUTION AND HOLLOW GOVERNMENT HURT OUR KIDS* (forthcoming Fall/Winter 2007).

274. Samuel J. Rascoff & Richard L. Revesz, *The Biases of Risk Tradeoff Analysis: Towards Parity in Environmental and Health-and-Safety Regulation*, 69 *U. CHI. L. REV.* 1763, 1802–08 (2002)

Introduced risks, too, are a potentially large cost of a move to risk avoidance. To the extent that risk-bearers substitute new practices for those that entail risk, they may open themselves to new—and costly—risks. Consider, for example, the increased incidence of diabetes among Native peoples that is associated with the move away from a traditional diet due to depletion and contamination of fish and other resources.²⁷⁵ Diabetes is emerging as a serious public health concern, with staggering costs along multiple dimensions.²⁷⁶ As one recent account puts it: “Diabetes threatens to hamper some of society’s most basic functions.”²⁷⁷ Although other factors are also believed to be at play, the increased incidence of diabetes in the United States is attributable in important part to shifts over the last few decades in humans’ diets and activity levels.²⁷⁸ The disproportionate number of immigrants and Native Americans with diabetes underscores the connection: “[N]ewcomers eating [contemporary] American diets for the first time are especially vulnerable.”²⁷⁹ Or consider, for example, the increased rate of obesity among Americans—which the ozone alerts’ admonitions to refrain from exercise outdoors does not help—and its attendant costs.²⁸⁰ And while risk reduction strategies may also introduce risks,²⁸¹ it is arguable that the profound behavioral changes demanded by many risk avoidance measures will be unmatched in scope and effect. Risk avoidance often asks risk-bearers to alter practices or lifeways in which they have long engaged in favor of untried alternatives. The potential harms introduced by these alternatives may be serious, as humans are left to adapt in short order to dramatic shifts in dietary and other practices—practices that had evolved over generations.²⁸²

(citing instances of unintended ancillary benefits from health and environmental regulations).

275. See NORGAARD, *supra* note 223, at 17, 22, 26 (discussing the causes and consequences of the move away from the traditional Native American diet).

276. See CTR. FOR DISEASE CONTROL & PREVENTION, NATIONAL DIABETES FACT SHEET (2005), available at http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2005.pdf (discussing a host of complications from diabetes, ranging from kidney disease, to blindness, to adverse effects on pregnancy, and estimating total costs of diabetes at \$132 billion).

277. N. R. Kleinfeld, *Diabetes and Its Awful Toll Quietly Emerge as a Crisis*, N.Y. TIMES, Jan. 9, 2006, at A1.

278. *Id.*

279. *Id.*

280. See, e.g., Emmett B. Keeler et al., *The External Costs of a Sedentary Life-Style*, 79 AM. J. PUB. HEALTH 975, 975 (1989) (concluding that “the lifetime subsidy from others to those with a sedentary lifestyle is \$1900” at a discount rate of 5%).

281. John D. Graham & Jonathan Baert Wiener, *Confronting Risk Tradeoffs*, in RISK VS. RISK: TRADEOFFS IN PROTECTING PUBLIC HEALTH AND THE ENVIRONMENT 1, 1 (John D. Graham & Jonathan Baert Wiener eds., 1995).

282. For a popular account that nonetheless synthesizes a rich technical literature, see generally GARY PAUL NABHAN, *WHY SOME LIKE IT HOT: FOOD, GENES, AND CULTURAL DIVERSITY* (2004)

Additionally, the claim that risk avoidance can provide “the same amount of *human* health protection” for less cost excludes on its face the other benefits of environmental risk regulation. As noted above, risk avoidance strategies miss entirely the adverse effects of contamination on all non-human components of ecosystems. Risk reduction measures, by contrast, produce ancillary benefits in the form of environmental health protection. As a consequence, were “the same amount of environmental health protection” to be added to the calculus, the cost savings from risk avoidance would again need to be decreased substantially.

As well, the claim that risk avoidance can provide “the same amount of human health protection” tends not to reflect an understanding of the term “human health” that comprises spiritual, cultural, and other aspects of human well-being. Although it is not possible to monetize effects along these dimensions, it can nonetheless fairly be said that any effort to account for these adverse effects would again mean that the “costs” of risk avoidance would need to be increased.

The claimed cost savings to be garnered from risk avoidance, then, are likely to be substantially overstated and enjoyed primarily in the short term. But, proponents might counter that even modest cost savings per measure could add up across the panoply of environmental regulatory efforts. And large regulatory expenditures might be expected to exact a toll in terms of societal wealth and, therefore, health.²⁸³ The response to this claim is two-fold. First, as noted above, risk avoidance may in fact be *more expensive* rather than less expensive than risk reduction over the long term. On any proper accounting, then, risk avoidance will often fail to deliver even “modest cost savings.” Second, although the claim that regulation increases mortality has attained something of the status of conventional wisdom, it has been largely discredited. Frank Ackerman and Lisa Heinzerling, for example, have painstakingly charted—refuted—the multiple leaps required

(explaining that changes to long-established dietary habits lead to increased disease among ethnic groups).

283. See, e.g., ROBERT W. HAHN ET AL., DO FEDERAL REGULATIONS REDUCE MORTALITY? (2000) (criticizing health and safety regulations on the grounds that they do not efficiently reduce mortality); Ralph Keeney, *Mortality Risks Induced by Economic Expenditures*, 10 RISK ANALYSIS 147 (1990) (suggesting that each expenditure of \$3 to \$7.5 million produces the loss of one statistical life); see also Randall Lutter & John F. Morrall, III, *Health-Health Analysis: A New Way to Evaluate Health and Safety Regulation*, 8 J. RISK & UNCERTAINTY 43, 49 tbl.1 (1994) (summarizing selected studies of the relationship between income and health). But cf. Cass R. Sunstein, *Is the Clean Air Act Unconstitutional?*, 98 MICH. L. REV. 303, 375 (1999) (“The most adventurous claims for ‘health-health’ comparisons arise when a costly regulation imposes health risks simply by virtue of its cost. . . . But these are adventurous claims, because they depend on contentious projections about the disemployment effects of particular regulations.”) (citing Cass R. Sunstein, *Health-Health Tradeoffs*, in FREE MARKETS AND SOCIAL JUSTICE 298, 298–317 (1997)).

to link studies finding a statistical relationship between income level and life expectancy (but only for incomes below \$20,000) to claims that a certain number of fatalities can be expected from health and environmental regulations requiring expenditures by regulated entities.²⁸⁴ In a related vein, Eban Goodstein has found there to be “no economy-wide trade-off” between jobs and the environment,²⁸⁵ pointing, among other things, to the fact that “there are now well over two million people who work directly or indirectly in environmentally related jobs”—a wealth-generating effect of environmental regulation that tends to get ignored by those tallying regulatory expenditures.²⁸⁶

2. Risks Avoided—But Only in Theory

Can risk avoidance deliver on even its revised claim? That is, can it provide “the same amount of human health protection from a target risk due to the direct mechanism of environmental fate, transport and exposure contemplated by the particular avoidance measure”?²⁸⁷ The limited efficacy of risk avoidance measures to date raises serious questions about whether such approaches can actually garner “the same amount of human health protection” understood in even this narrower sense. Consumption warnings and ozone alerts reach as few as half of the people at risk, are understood by only a fraction of those reached, and are followed by only a fraction of those who understand them. Fences are frequently scaled. Institutional controls are unreliably implemented, maintained, and enforced. Although agencies have made some progress in improving risk communication—for example, agencies now routinely translate fish consumption advisories into multiple languages—it is clear that their efforts continue to fall far short.²⁸⁸

284. ACKERMAN & HEINZERLING, *supra* note 135, at 56–59 & nn.20–25; see also Frank Ackerman, *The Unbearable Lightness of Regulatory Costs*, 33 *FORDHAM URB. L. J.* 1071, 1092 (2006) (arguing that there is unlikely to be a significant trade-off between prosperity and regulation and presenting evidence that mortality decreases during recessions and increases with employment).

285. EBAN GOODSTEIN, *THE TRADE-OFF MYTH: FACT AND FICTION ABOUT JOBS AND THE ENVIRONMENT* 4 (1999); see also ACKERMAN & HEINZERLING, *supra* note 135, at 58 (discounting the theory that regulation is always economically detrimental); Ackerman, *supra* note 284, at 1092 (finding that regulation does not cause net reduction in wealth).

286. GOODSTEIN, *supra* note 285, at 4.

287. See discussion *supra* Part II.C.1.

288. See, e.g., U.S. ENVTL. PROT. AGENCY, *FISH ADVISORY NEWSLETTER* (2006), available at <http://epa.gov/waterscience/fish/advisories/newsjuly06.htm> (recounting a study showing that the Stevens Creek reservoir in California had elevated levels of mercury, as high as five times the state standard for human health, but that signs had yet to be posted in Spanish and Vietnamese, as the local agency had said it would do by the start of the 2005 fishing season); Dean Scott, *EPA Considering Bilingual Pesticide Labels to Aid Workers, Growing Hispanic Population*, *BNA DAILY ENV'T. REP.*, June 16, 2006, at A-11 (reporting that EPA is only in the early stages of its determination whether to require

Indeed, a primary recommendation of the recent GAO review of institutional controls addressed such agency failures.²⁸⁹ At the very least, real improvements in the efficacy of risk avoidance measures would require substantial time and resources—investments that must be added to the cost side of the ledger.²⁹⁰ Given the nature of some of the hurdles, however, it is doubtful whether even improved communication, implementation, maintenance, and enforcement efforts could ever be completely effective at getting people to change their lifeways. As Pendergrass concedes, “[i]t is unlikely that such public health warnings [or notices] can be 100% effective at preventing all the exposure to risk, because some people will not receive the warning, some who receive it will not understand it, and some who understand it will choose to ignore it.”²⁹¹ There is, ultimately, no guarantee that risk avoidance will ever be able to effect the desired behavioral changes in all those at risk—no guarantee that the chain joining environmental contamination and adverse human health effects will in fact be broken.

Note, however, that noncompliance with warnings, fences, and other prohibitions may be unproblematic from the perspective of those advancing autonomy arguments. That is, so long as risk-bearers can be said to have been adequately informed of the relevant risks, their choice not to comply might properly be viewed as an exercise of their autonomy.²⁹² As such, the fact that significant numbers of risk-bearers do not comply with, for example, fish consumption advisories does not (necessarily) suggest that risk avoidance is not effective. To the contrary, it might signal that this risk avoidance approach has functioned precisely as intended, by allowing each individual to determine for herself the amount and kind of risk to which she will be subjected. However, one of the premises of this argument, that risk-bearers are fully informed of the competing risks, remains—and may always remain—elusive. This fact is not a speed bump but a stop sign: it may be fatal to an autonomy-based case for a shift to risk avoidance. There are other, more fundamental problems with autonomy arguments in this

bilingual warning labels and use instructions). Note, too, that progress here has opportunity costs, as agencies devote resources to refining risk avoidance strategies at the expense of risk reduction efforts. *See, e.g., id.* (quoting an EPA official, who cited “resource implications” of bilingual pesticide labeling for EPA, because the agency would have to develop a regulatory system to determine whether the translated warnings and use instructions were accurate enough to protect workers and consumers).

289. GOV'T ACCOUNTABILITY OFFICE, *supra* note 191, at 34–35 (finding EPA's ongoing implementation of institutional controls to be lacking).

290. *See, e.g.,* NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 90–127 (discussing the extensive changes that health and environmental agencies would need to undertake in order to address the deficiencies in fish consumption advisories from the perspective of tribes, communities of color, and low-income communities).

291. Pendergrass, *Redevelopment of Brownfields*, *supra* note 48, at 10,253.

292. W. Kip Viscusi, *Risk Equity*, 29 J. LEGAL STUD. 843, 851 (2000).

context, including the point that expressed preferences may not represent truly autonomous choices.²⁹³ This is so because preferences are structured by one's circumstances—they are not endogenous to the legal rules that allocate entitlements and wealth in the first place.²⁹⁴ As such, the claim that we ought to defer without question to risk-bearers' apparent preferences for greater levels of risk (i.e., when they do not comply with advisories or warnings) requires further argument—it cannot be supported merely by the existence of these preferences.²⁹⁵

3. Autonomy, Responsibility, and Identity

Having conceded that risk avoidance measures will likely never be 100% effective, Pendergrass nonetheless concludes that, despite this flaw, warnings and notices “remain a highly useful institutional control because they are an inexpensive method of warning large populations about risk and allowing individuals to reduce their own risk of exposure.”²⁹⁶ Although this point is somewhat ambiguously presented—it could be taken to support either autonomy- or responsibility-based arguments—it raises an important consideration: *who* is it that will be left to “reduce their own risk of exposure?” Arguments that risk avoidance enhances autonomy or increases individual responsibility take on new dimensions once one knows the identity of those exposed and knows, therefore, who is likely to be asked to undertake avoidance (or to “choose” not to do so). Among other things, agencies can no longer claim to be debating the relevant questions in the abstract, as if only identityless, “statistical” lives were at stake.

Given that risk avoidance strategies focus on the point of human exposure, government decision makers must identify and gather information about those exposed. As noted above, agencies need to learn who these people are, how they live, and what they value. Additionally, if agencies hope to improve risk communication to a level that would support a contention that risk-bearers are indeed fully informed—a prerequisite for autonomy-based claims—agencies' knowledge of those exposed would need to become quite intimate.

293. See, e.g., Cass R. Sunstein, *Legal Interference with Private Preferences*, 53 U. CHI. L. REV. 1129, 1150 (1986) [hereinafter Sunstein, *Legal Interference*]; Robin L. West, *Taking Preferences Seriously*, 64 TUL. L. REV. 659, 670-75 (1990) (arguing that an individual's or a community's preferences may be “heavily influenced by, if not the product of, extant social structures” that are the product of illegitimate “hierarchies of power” and that are often antithetical to the preference holder's true interests).

294. See Sunstein, *Legal Interference*, *supra* note 293, at 1145–58.

295. *Id.*

296. Pendergrass, *Redevelopment of Brownfields*, *supra* note 48, at 10,253.

In fact, agencies currently know or should know the identities of those exposed in numerous contexts in which risk avoidance presents itself as among the regulatory options. Notably, members of American Indian tribes, people of color, and low-income individuals are disproportionately among the most exposed to environmental contaminants. It is to these individuals that the choice of risk avoidance will be offered and upon these individuals that the responsibility for reducing risk will be placed. Therefore, arguments from autonomy and responsibility must be evaluated in light of this context, in light of the identifiability—and particular identity—of the risk-bearers.

Among other things, the fact that those asked to undertake risk avoidance are disproportionately members of American Indian tribes, people of color, and low-income individuals ought to render problematic any assertions about the sort of risks “they” would choose to accept, the sort of avoidance “they” would find unobjectionable. When autonomy-based claims are made chiefly by those unlikely to have to undertake avoidance or, especially, by those who would benefit from weakened risk reduction efforts, they become suspect.²⁹⁷ When they are also made with the knowledge that those asked to undertake risk avoidance are disproportionately people of color, members of American Indian tribes, and low-income individuals, they become deeply troubling.²⁹⁸ Similarly, responsibility-based claims become objectionable where this is the case.²⁹⁹

There is a counterargument, however: the need for government decision makers to avoid the ills of paternalism and to respect individual risk-bearers’ choices, as a matter of autonomy, is all the more acute where those individuals have not in the past been respected as agents in public or private spheres. The difficulty here comes with the term “choice.” How do government decision makers ascertain what individuals would choose in this context? If such determinations are to be taken from expressions of willingness-to-pay (WTP), they are hobbled by the problems introduced by ability to pay. Given that risk-bearers tend to have lower incomes, the WTP criterion systematically skews outcomes in favor of weakened risk reduction. If such determinations are to be taken from expressions via the political process, they are distorted by a history of discrimination and resulting disempowerment for many of the groups disproportionately among the risk-bearers. Again, this method threatens systematically to fail

297. See, e.g., *supra* notes 148 and accompanying text.

298. *Id.*

299. When these arguments take the form of “blame the victim,” they are particularly troubling, as they tap into sentiments underlying discriminatory practices that we as a society have disavowed. See discussion *supra* notes 149–51 and accompanying text.

to register the perspectives of risk-bearers. Can we simply ask those likely to be among the risk-bearers?³⁰⁰ There is certainly an important role for participation by those affected in any decision to opt for risk avoidance. But, even here, a “choice” may not meaningfully exist when one’s circumstances place one over a barrel.³⁰¹ Although much more might be said about these points, it seems that with even this sketch of the issues before us, the identity of those who will be asked to undertake avoidance, or to “choose” not to, means that autonomy- and responsibility-based claims need to be evaluated in a different light than if we were all equally likely to be among the risk-bearers.

4. Normalization or Homogenization?

To the extent that risk avoidance elicits behavioral changes, it can have the effect of normalizing practices in a society in the sense of reducing the number and variety of lifeways. Non-ordinary pursuits and practices are likely to be the first to be discouraged and so the first to die out, although, as observed above, if decision makers turn increasingly to risk avoidance, it may be that a widening net will be cast. One might think this is all to the good. Uniformity, among other things, begets efficiencies. If fish consumption practices were similar across geographies and cultures, for example, risk management efforts could dispense with the practical, legal, and ethical issues that attend variability. On the other hand, one might understand something to be lost as a result. One might value a diversity of lifeways, as discussed above, because one values the potential societal benefits, perhaps as yet undiscovered, to be obtained from some of the various practices; because one supports cultural self-determination for the practitioners; or because one delights in a multiplicity of practices and life experiences. On this view, the specter of homogenization and assimilation—even if inadvertent by-products of attaining other goals in risk regulation—would bolster the case against reliance on risk avoidance.

The arguments for normalization also need to be evaluated in light of the identity of those likely to be asked to undertake risk avoidance. The

300. See, e.g., Miguel Bustillo, *Cleanups Fuel Debate: How Much Is Enough?*, L.A. TIMES, Dec. 16, 2003, at A1 (discussing the conflict between redevelopment of economically depressed areas and strict environmental regulation).

301. *Id.*; see, e.g., THOMAS O. MCGARITY & SIDNEY A. SHAPIRO, WORKERS AT RISK: THE FAILED PROMISE OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION 271–72 (1993) (challenging the assumption that low-paid workers in hazardous industries make “free and unconstrained risk decisions” and suggesting that they “may be acting more out of desperation than of choice”); Cass R. Sunstein, *Preferences and Politics*, 20 PHIL. & PUB. AFF. 3, 19–24 (“Poverty is perhaps the most severe obstacle to the free development of preferences and beliefs.”).

suggestion that practices are unnecessary or voluntary is more likely to be made in the first place where it is tribes or other non-dominant groups that will be asked to give up their ways. As such, this suggestion echoes efforts throughout history to denigrate and discourage tribes' traditional, cultural, and spiritual practices.³⁰²

5. Alternatives, Optimism, and Intergenerational Equity

The concern for the finite nature of the earth's resources remains: if risk avoidance were allowed to supplant risk reduction, eventually, there would be no uncontaminated environments and as a result, no healthful alternatives. Risk avoidance, then, is a strategy of diminishing possibilities. However, it is arguable that there might be some occasion for optimism inasmuch as humans have shown ourselves to be resilient and creative. Perhaps we should trust in our ability to invent new means of decontaminating fouled environments, new alternatives for avoiding contact with the contaminants that remain, or even new ways of perceiving the options. Advances in desalinization technology, for example, might open up the possibility that ocean waters could service human needs even if all freshwater sources were to become contaminated or depleted.³⁰³ Such solutions, of course, are highly speculative. Moreover, solutions may come only far in the future, such that generations would be harmed in the meantime.³⁰⁴ The solutions may themselves be extremely costly to bring to application, such that the cost side of the ledger would have to be recalculated. Or they may be unpalatable on moral, philosophical, aesthetic, and other grounds.³⁰⁵

On balance, a shift to risk avoidance in any particular instance is a choice to forego a web of ancillary benefits, for human and ecological health, for the current and, especially, future generations; to shift the responsibility for addressing risk from risk-producers to risk-bearers—risk-bearers who will necessarily be identified in the course of implementing the risk avoidance measure and who may be members of groups entitled to

302. Anaya, *supra* note 230, at 228–29.

303. See, e.g., ROBERT GLENNON, *WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA'S FRESH WATERS* 81–82 (2002) (discussing the potential and limitations of desalinization as an alternative to the use of groundwater).

304. See, e.g., EDITH BROWN WEISS, *IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY* 232–47 (Richard Falk ed., United Nations Univ. 1989) (1988) (contending that contamination to drinking water will result in intergenerational inequity).

305. See, e.g., Laurence H. Tribe, *Ways Not to Think About Plastic Trees: New Foundations for Environmental Law*, 83 *YALE L.J.* 1315, 1319–21 (1974) (discussing attitudes regarding the use of surrogates for nature).

particular consideration; to offer these risk-bearers one or a few specific choices for avoidance—some or all of which may be impossible from their perspectives, some or all of which may introduce their own roster of risks; to prefer certain practices or ways of living over diverse alternatives; and to opt for a strategy for risk regulation with diminishing and ultimately finite possibilities. And this is only if all goes well—that is, if agencies can remedy the numerous problems with communicating, implementing, and enforcing in perpetuity the risk avoidance measure. Thus, it seems likely that risk avoidance will be inappropriate in most instances. But, in any particular instance, pollution problems may seem intractable and cost savings may be large. To be sure, no one wants to pay any more for human and ecological health protection than is necessary. How should decision makers evaluate the relevant tradeoffs?

III. EVALUATING RISK AVOIDANCE

Risk avoidance charts a course that departs from current commitments to risk reduction—commitments that are enshrined in environmental statutes and other laws. As the discussion so far has suggested, it is a course that is sometimes impermissible and often ill advised. For those instances in which agencies or legislatures might permissibly contemplate risk avoidance, however, we need a mode of analysis that allows them to determine whether the departure is warranted. One decisional tool, cost-benefit analysis, is currently prominent among the candidates.³⁰⁶ But, I will argue, it would be a mistake to evaluate a shift to risk avoidance by means of cost-benefit analysis, a mistake to seek to rationalize risk regulation solely in accordance with an efficiency criterion. This decisional tool would undermine our ability to make considered decisions about the kind of society we wish to be and the kind of world in which we wish to live. In its quest for a certain brand of rationality, cost-benefit analysis narrows our field of vision. It frames the discussion in a way that eliminates from view many of the perils highlighted above. It fails to engage the crucial questions “what is at stake, *for whom?*” in a move to risk avoidance. As a consequence, it stands to sanction a departure from a collective commitment to risk reduction without ever having demanded a response to the basic questions involved—or having acknowledged that these questions are on the table.

There is more at stake in the decision whether to rely on risk avoidance

306. See, e.g., Richard A. Posner, *Cost-Benefit Analysis: Definition, Justification, and Comment on Conference Papers*, 29 J. LEGAL STUD. 1153 (2000) (discussing role of cost-benefit analysis in public decision making).

than is captured in the formulation "human health protection per dollar." That is to say, even if risk regulation were rationalized along these lines, we might be unsatisfied—indeed, troubled—by the result. There is a difference between the question "how much risk?" and the question "which risks are morally, culturally, and otherwise acceptable?"³⁰⁷—or, as Annette Baier puts it, "which harms to notice[?]"³⁰⁸ Risk avoidance, with its attendant perils, brings to the fore important inadequacies with a focus exclusively on the first question. This Part outlines recent calls for increased rationality in risk regulation to be implemented, among other things, by means of cost-benefit analysis in government decisions. This Part argues that this decisional tool misframes the debate in ways that make it ill suited to defend a shift to risk avoidance. Finally, this Part closes by noting several considerations to be addressed by a properly framed debate on the merits of risk avoidance in any particular instance.

A. Misframing the Debate: Rationalizing Risk Regulation

In order to think coherently about risk avoidance, we need to appreciate what is at stake. Decisions about risk regulation adjudicate important questions of value, in the process choosing among competing visions of the ideal society. When these decisions are made by means of cost-benefit analysis, however, these questions are not acknowledged; these choices are made by default.

Should the human health risks of ground-level ozone be addressed by reducing emissions of nitrogen oxides and volatile organic compounds from the array of sources responsible for their release into the environment? Or should these risks be addressed by asking asthmatic children to stay indoors; by requiring construction workers to wear respirators; or by advising those in sensitive subpopulations—e.g., those with emphysema—to move to areas with better air quality? Should the human health risks of methylmercury contamination be addressed by reducing emissions of mercury from coal-fired power plants? Or should some of these risks be addressed by warning women of childbearing age and children who eat fish to reduce or eliminate fish from their diets? As the preceding discussion has highlighted, the issues implicated by these tradeoffs are complex, with

307. Carl F. Cranor, *The Use of Comparative Risk Judgments in Risk Management*, in TOXICOLOGY AND RISK ASSESSMENT: PRINCIPLES, METHODS, AND APPLICATIONS 817, 817 (Anna M. Fan & Louis W. Chang eds., 1995).

308. Annette Baier, *Poisoning the Wells*, in VALUES AT RISK 49, 49 (Douglas MacLean ed., 1986). "Morality is the culturally acquired art of selecting which harms to notice When is a public policy that entails death for some and risk of death for more a policy that offends our moral standards? Which deaths, and impositions of risk of death, are wrongful, and wrongs against those concerned?" *Id.*

important—often, profound—questions adjudicated as a consequence.

1. Cost-Benefit Analysis

Much is at stake in decisions whether to rely on risk avoidance—much that does not get encompassed by a calculus framed in terms of “human health protection per dollar.” Yet this calculus threatens to be the touchstone for evaluating any shift to risk avoidance. As noted above, the chief justification for risk avoidance is the cost savings it promises.³⁰⁹ As such, calls for a shift to risk avoidance tend to be advanced in these terms, with advocates claiming that risk avoidance measures can provide the same amount of human health protection for less cost than can risk reduction approaches. These calls, further, come at a time when proponents of cost-benefit analysis have ambitions that it become the dominant mode of analysis in risk regulation.³¹⁰ Indeed, Cass Sunstein has declared the arrival of “the cost-benefit state.”³¹¹

Cost-benefit analysis is a decisional tool that entails monetizing and tallying the costs and benefits of a regulatory option.³¹² Many proponents of cost-benefit analysis argue that it should be enlisted to determine whether to proceed: a regulatory option may go forward where the net benefits exceed the costs, but not otherwise.³¹³ In general, these proponents argue that regulatory efforts should be guided by an efficiency criterion.³¹⁴ That is, regulatory efforts should seek to maximize human health protection—or, more precisely, human lives or “quality-adjusted life years” saved—per

309. See discussion *infra* Part II.B.1.

310. See, e.g., Robert W. Hahn & Cass R. Sunstein, *A New Executive Order for Improving Regulation? Deeper and Wider Cost-Benefit Analysis*, 150 U. PA. L. REV. 1489 (2002) (arguing that a more pervasive commitment to cost-benefit analysis would improve regulation).

311. CASS R. SUNSTEIN, *THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION* ix (2002). *But cf.* Heinzerling, *supra* note 226, at 112–13 (“Most of our environmental laws do not require or even allow cost-benefit analysis.”).

312. See, e.g., Thomas O. McGarity, *A Cost-Benefit State*, 50 ADMIN. L. REV. 7, 15–16 (1998) (explaining the mechanics of cost-benefit analysis in the context of health and environmental regulation).

313. Note that some proponents see a less determinative role for cost-benefit analysis, suggesting that it be used merely to inform public debate about risk regulation. See, e.g., SUNSTEIN, *LAWS OF FEAR*, *supra* note 139, at 129; Posner, *supra* note 306, at 1153–56 (discussing three roles for cost-benefit analysis, including as a “decision rule”). One commentator questions “whether [cost-benefit analysis] can provide any meaningful information at all.” Amy Sinden, *Cass Sunstein’s Cost-Benefit Lite: Economics for Liberals*, 29 COLUM. J. ENVTL. L. 191, 241 (2004) (arguing that even when used to inform public debate, cost-benefit analysis obscures rather than clarifies the reasons behind government decision making).

314. See Posner, *supra* note 306, at 1153–56 (discussing use of Kaldor-Hicks efficiency criterion to evaluate government regulation via cost-benefit analysis).

regulatory dollar spent.³¹⁵ This goal is undergirded philosophically by a welfarist claim that we ought, in public decisions, to maximize the satisfaction of individual preferences.³¹⁶ Each individual, it is said, is the best judge of her own welfare; as such, public policies evince a respect for human dignity and autonomy when they reflect these preferences.³¹⁷ If risk regulation were to be rationalized along these lines, proponents claim, all would be well—indeed, all would be equitable.³¹⁸

In the context of risk regulation, cost-benefit analysis requires decision makers to assign a monetary value to the relevant risk, typically by discerning the monetary value that ordinary people would assign to the risk.³¹⁹ Ideally, according to proponents, decision makers would be able to discern the amount of money that each person would be willing to pay to reduce each particular risk that she faces.³²⁰ Regulation could then track willingness-to-pay (WTP), perfectly matching the level of regulatory protection to each individual's preferences by providing him "no more and no less than his WTP for each risk."³²¹ Practice departs from this ideal (among other reasons) because of the administrative and other difficulties in ascertaining every individual's WTP, and because of the collective nature of the benefits at issue—improved air quality cannot feasibly be provided to one without being provided to all.³²² So decision makers enlist proxies (e.g., they borrow valuations gleaned from occupational and other contexts and so assume that an individual does not perceive differently different sources of statistically equivalent risk), consider aggregates (e.g., they assume that there is no difference among individuals in their views respecting even the same risk), and otherwise muddle through (e.g., they ignore the implications of the fact that one's WTP turns on one's ability to pay),³²³ ultimately assigning a dollar value to the risk that enables them to

315. See, e.g., W. Kip Viscusi, *Monetizing the Benefits of Risk and Environmental Regulation*, 33 *FORDHAM URB. L.J.* 1003 (2006) (discussing various means of quantifying human health benefits, including in terms of "quality-adjusted life years").

316. See, e.g., Viscusi, *supra* note 292, at 862 (stating that the "appropriate policy objective is maximization of expected individual welfare, not risk minimization").

317. *Id.*

318. *Id.* But cf. SUNSTEIN, *LAWS OF FEAR* *supra* note 139, at 129 (claiming that efficiency ought not be the sole criterion for risk regulation and recognizing that distributive issues are simply not considered in a cost-benefit inquiry).

319. See, e.g., SUNSTEIN, *LAWS OF FEAR*, *supra* note 139, at 130.

320. *Id.*

321. *Id.* at 146.

322. *Id.* at 147.

323. The various departures in practice from the idealized decisional tool that cost-benefit analysis offers in theory leave Herman Leonard and Richard Zeckhauser to defend it thus: "it is not perfect, but it is better than the alternatives." Herman B. Leonard & Richard J. Zeckhauser, *Cost-Benefit Analysis Applied to Risks: Its Philosophy and Legitimacy*, in *VALUES AT RISK*, *supra* note 308, at 31, 34.

determine whether, on balance, the costs of reducing it are warranted.

Recent efforts to hone this decisional tool have focused, moreover, on correcting for irrationalities in ordinary people's assessments of risk. Justice Stephen Breyer has argued that the failures of risk regulation are attributable to a "vicious circle," fueled by irrational public perceptions of risk.³²⁴ Cass Sunstein has similarly suggested that risk regulation's ills stem from the numerous "cognitive blunders" that individuals make in evaluating risk.³²⁵ Both Breyer and Sunstein essentially make a case for maximizing the preferences individuals *would* have, were they more rational evaluators: they argue that politically insulated experts should be entrusted with the task of overriding the public's evaluations of risk in order to rationalize risk regulation.³²⁶ Both Breyer and Sunstein allow that what appears to be irrationalities in individuals' evaluations of risk may instead reflect sentiments that are not irrelevant to public decisions regarding risk regulation.³²⁷ However, both conclude that there should be a large, if not decisive, role for insulated experts.

It would be a mistake, however, to evaluate a turn to risk avoidance solely by means of cost-benefit analysis. As Frank Ackerman and Lisa Heinzerling have documented, the shortcomings of cost-benefit analysis as a decisional tool are many, infecting both its practical applications and its theoretical underpinnings.³²⁸ Of particular importance here is the fact that an inquiry framed in terms of maximizing "human health protection per dollar" misses a variety of factors that are relevant to the determination of which risks are morally, culturally, and socially acceptable. As Carl Cranor observes, "[w]hat is important for public decisions is not only the magnitude and probability of risks, but also a variety of factors that bear on the *acceptability* of risks posed"—morally salient properties that we should take into account in thinking coherently about risk regulation.³²⁹ When the EPA tallied the costs and benefits of the Clean Air Mercury Rule, discussed above, it concluded that reducing mercury emissions would cost coal-fired utilities \$160 million in 2010, \$100 million in 2015, and \$750 million in 2020.³³⁰ EPA pegged the benefits of reducing mercury emissions at

324. BREYER, *supra* note 125, at 33.

325. SUNSTEIN, *LAWS OF FEAR*, *supra* note 139; *see also* CASS R. SUNSTEIN, *RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT* 43–47 (2002) (suggesting that emotions and alarmist biases also contribute to poor risk assessment).

326. BREYER, *supra* note 125, at 33–39; SUNSTEIN, *LAWS OF FEAR*, *supra* note 139, at 124–27.

327. *Id.*

328. ACKERMAN & HEINZERLING, *supra* note 135.

329. Cranor, *supra* note 307, at 817.

330. U.S. ENVTL. PROT. AGENCY, *REGULATORY IMPACT ANALYSIS OF THE CLEAN AIR MERCURY RULE: FINAL REPORT 7-7*, (2005), *available at*

between \$0.07 and \$2.0 million.³³¹ Leaving to the side concerns with EPA's method,³³² the larger question remains: what does this tally tell us—and fail to tell us—about whether to require risk reduction in this instance? It clearly suggests that the costs of risk reduction outweigh the benefits (so tallied).³³³ But it does not tell us whether it is permissible for humans to hasten the extinction of another species (e.g., the Florida panther, a species that is currently endangered and among those adversely affected by methylmercury contamination).³³⁴ It does not tell us whether it is tolerable that members of a few discrete groups within the population (e.g., women and children, Native peoples, and Southeast Asian Americans) will be asked to bear the remaining risks—or undertake avoidance (with the risks avoidance introduces).³³⁵ It does not tell us whether it is acceptable that some of these groups (e.g., the various Ojibwe tribes and other fishing peoples) will be made to suffer an affront to their rights to cultural self-determination.³³⁶ It does not tell us whether it is desirable for humans to preside over diminishing options for food (e.g., the numerous fish, shellfish, and other species contaminated with methylmercury) and other resources. Each of these questions reflects judgments of value that are highly contextualized and risk specific, that take into account the nature of the risk and the possibilities for avoidance. These judgments ought to bear on societal determinations of a risk's acceptability.

2. Public Values and Risk Perception

Each risk—with its attendant possibilities for avoidance—might be

http://www.epa.gov/ttn/atw/utility/ria_final.pdf [hereinafter EPA, CAMR RIA].

331. *Id.*

332. *See, e.g.*, STEINZOR, *supra* note 273.

333. *But cf.* Lisa Heinzerling et al., *supra* note 123.

EPA makes several crucial cuts in its benefit calculus: it counts only benefits to human health (and so excludes ecological health and other benefits, including, e.g., economic, social, political, cultural and spiritual well-being for the fishing tribes), and of these human health benefits, it counts only neurodevelopmental effects and so excludes cardiovascular and other effects. It further winnows the benefits, by counting only neurodevelopmental effects that are captured by IQ decrements. Various independent analyses have demonstrated that quantifying these excluded benefits would reverse the conclusion of the analysis, with the benefits of regulation dwarfing the costs.”

Id.

334. U.S. GEOLOGICAL SURVEY, THE SOUTH FLORIDA MERCURY SCIENCE PROGRAM (2005), http://www.sofia.usfs.gov/publications/posters/merc_program.

335. *See* discussion *supra* notes 23–26 and accompanying text.

336. *See* Robert J. Miller, *Exercising Cultural Self-Determination: The Makah Indian Tribe Goes Whaling*, 25 AM. INDIAN L. REV. 165, 167 (2000–2001) (noting the struggles of the Makah tribe “to preserve a practicing tribal culture on its own terms”).

thought to have a host of morally salient attributes beyond those of probability and magnitude. Cranor, for example, suggests among these attributes whether a risk is naturally caused or anthropogenic in origin; whether exposure to a risk is voluntarily or involuntarily undertaken; whether a risk can be avoided readily or only with difficulty; whether the pursuits that entail risk are central to risk-bearers' life plans or merely peripheral; and whether the burdens of a risk are distributed equally or not.³³⁷

In fact, individuals' assessments of a particular risk are likely to reflect their perspectives on these attributes of the risk and to encompass individuals' judgments of value along these and other lines. Recent work by cognitive psychologists and other social scientists bears this out and suggests that cultural values play a vital role in risk perception, infusing all of the mechanisms through which individuals understand and appraise risk.³³⁸ In view of these findings, Dan Kahan, Paul Slovic, Donald Braman, and John Gastil posit that humans are "cultural evaluators" of risk.³³⁹ They explain: "individuals adopt stances toward risks that express their commitment to particular ways of life. Their risk perceptions might or might not be accurate when evaluated from an actuarial standpoint; policies based on them might or might not be in the interest of society measured according to any welfarist metric."³⁴⁰ Nevertheless, each individual's perceptions embody a coherent, culturally partisan vision of virtue, justice, and the ideal society.³⁴¹

On this view, "expert cost-benefit analysis" not only fails to engage important questions regarding a risk's moral, cultural, and social acceptability, but it also obscures the fact that these questions are at stake. The idea that politically insulated experts should override the public's evaluations of risk where these are irrational misses the point that individuals' "irrational" appraisals are inseparable from their "considered values."³⁴² It is not possible to elicit only the second, while overriding the

337. Cranor, *supra* note 307, at 818–24.

338. See, e.g., Dan M. Kahan et al., *Fear of Democracy: A Cultural Evaluation of Sunstein on Risk*, 119 HARV. L. REV. 1071, 1083 (2006) (reviewing CASS R. SUNSTEIN, *LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE* (2005)). For these authors' continued exchange, see Cass R. Sunstein, *Misfearing: A Reply*, 119 HARV. L. REV. 1110 (2006); Dan M. Kahan & Paul Slovic, *Cultural Evaluations of Risk: "Values" or "Blunders"?*, 119 HARV. L. REV. F. 166 (2006), http://www.harvardlawreview.org/forum/issues/119/feb06/kahan_slovic.pdf.

339. Kahan et al., *Fear of Democracy*, *supra* note 338, at 1087. Kahan and his colleagues distinguish this from views that humans are "rational weighers" or, as Sunstein and Breyer would suggest, "irrational weighers" of risk. *Id.*

340. *Id.* at 1088 (emphasis omitted).

341. *Id.*

342. *Id.* at 1073.

first. As Kahan and his co-authors observe, “[r]eliance on expert cost-benefit analysis, in these circumstances, becomes less a strategy for rationally implementing public values than a device for strategically avoiding political disputes over individual virtue and collective justice.”³⁴³ Yet these disputes get decided, if only by default. With its cost-benefit analysis in hand, for example, EPA issued its final rule governing mercury emissions from coal-fired utilities: it opted for little risk reduction and in the process determined the answers to questions of inter-species and inter-generational equity, distributive justice, cultural flourishing, and other aspects of how society should be ordered.³⁴⁴ Among the judgments regarding social good that are buried in EPA’s analysis is the following: EPA counts as a *benefit* of mercury contamination the money society saves because children with lower IQs as a result of methylmercury exposure will need fewer years of school.³⁴⁵ By this logic, a rule that does little to reduce contamination is preferable, because it preserves these “benefits.” Conversely, a more stringent rule would have required that the additional costs of educating healthy children (i.e., children free from neurological damage due to methylmercury exposure) be tallied alongside the other costs of controlling mercury at the source. Thus, an additional consequence of reliance on expert cost-benefit analysis is that it obscures what is at stake. Kahan and his co-authors explain: “because [the view that we should rely on expert cost-benefit analysis] ignores the decisive role that cultural values play in shaping competing perceptions of risk, [it] mutes the function that risk regulation plays in adjudicating between competing worldviews.”³⁴⁶

3. What Is at Stake, for Whom?

In order to think coherently about risk avoidance, we need to appreciate not only what is at stake but *for whom*. Decisions about risk regulation adjudicate important questions of justice, in the process affecting the life prospects for both winners and losers. When these decisions are made by means of cost-benefit analysis, however, these prospects get determined

343. *Id.*

344. EPA, CAMR RIA, *supra* note 330.

345. *Id.* at 10-46 to 10-47 (citing data that the average effect of a one point decrease in IQ is a 0.1007 percent decrease in years of schooling and that the average annual expenditure per student is \$5,500). Note that EPA’s Regulatory Impact Analysis for the CAMR comprises some 566 pages. *Id.*

346. *Id.* at 1108. Kahan and his colleagues suggest that this might, in fact, be a virtue of approaches such as that suggested by Sunstein, inasmuch as it would allow public discourse by obfuscating conflicts of value, ultimately enabling those with diverse views and values to come together at the level of “incompletely theorized agreements,” as Sunstein has used the term. *Id.*; see CASS R. SUNSTEIN, LEGAL REASONING AND POLITICAL CONFLICT 35-61 (Oxford Univ. Press 1996) (suggesting that laws often reflect the absence of completely theorized agreements).

without acknowledging to whom the benefits will go or on whom the burdens will fall and without considering what is at stake from their perspectives.

Decisional tools such as cost-benefit analysis assess tradeoffs in the abstract, that is, without identifying in advance how any particular individual (or group of individuals) will fare as a result. As noted above, cost-benefit analysis presupposes that the goal of risk regulation is efficiency and that government decision makers ought to maximize the satisfaction of individual preferences respecting risk. In theory, cost-benefit analysis does not prefer any one individual's valuation relative to any other. Rather, preferences are maximized in the aggregate. An outcome is generally deemed efficient if it satisfies the Kaldor-Hicks test, that is, if the winners will gain more than the losers will lose.³⁴⁷ Debate is undertaken in terms of identityless, "statistical lives," and, importantly, as if we were all equally likely, *ex ante*, to be among the winners and the losers.

But with risk avoidance on the table, decision makers are privy to identifying information. As noted above, given its focus on the point of exposure, risk avoidance approaches require decision makers to reorient their expertise, from a focus on the entities and processes that produce environmental contamination to the humans that are exposed to the contaminants. As a consequence, decision makers need to identify who will be asked to protect themselves by altering the practices that expose them to risk. For example, because agencies need to determine to whom to direct fish consumption advisories, they need to learn the identities of the individuals most exposed.³⁴⁸ Because agencies need to decide how to communicate with and select avoidance alternatives that are plausible for these individuals, agencies need to learn a great deal about their circumstances.³⁴⁹ As a result, decision makers can no longer maintain that we are all equally likely to be among the winners and the losers. They know, in advance, who will be faced with the "choice" entailed by a shift to risk avoidance—and who will end up among the losers.

This point has implications, in turn, for the overall determination of whether a particular risk, with its attendant possibilities for avoidance, is morally, culturally, and socially acceptable. If one takes Cranor's enumeration as a starting point, among the relevant attributes is whether the

347. For a critique of the Kaldor-Hicks or "potential Pareto" criterion in public decisions about risk, see, e.g., ACKERMAN & HEINZERLING, *supra* note 135, at 34–35.

348. NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 40 (noting the consequences of issuing fish consumption advisories without an understanding of the "affected communities").

349. *Id.*

burdens of a risk are distributed equally.³⁵⁰ For example, whereas we might find the risk from current levels of ozone pollution in the Los Angeles area—with the means of avoidance suggested by ozone alerts—to be acceptable, on balance, if the burden were distributed equally across the population, we might find this risk unacceptable were the burden borne primarily by African American and Latino children.³⁵¹

This point bears as well on an evaluation of other morally salient attributes of a risk. Once one knows the identity of those who will be asked to undertake avoidance measures, one can (indeed, must—if there is to be any hope that risk avoidance will be effective, in the sense of eliciting “compliance”) learn something about these individuals’ understandings about the possibilities for avoidance. That is, one can consider, from these risk-bearers’ perspectives, whether exposure to the risk can be said to be voluntarily or involuntarily undertaken; whether the risk can be avoided readily or only with considerable difficulty; whether the practices that entail risk are central to their life plans or merely peripheral.³⁵² To illustrate, whereas we might find modest reductions in the levels of PCBs and other contaminants in the Duwamish Waterway and elsewhere in the Puget Sound to be tolerable, on balance, if the resulting fish consumption advisories affected only the “typical U.S. consumer,” we might find this risk and means of avoidance to be intolerable if those affected were mainly members of the various Asian American and Pacific Islander groups in the area who cannot afford to substitute other sources of protein for the fish they would catch from these waters.³⁵³ Likewise, risk avoidance in this context might be intolerable if those affected were mainly members of the several Native American peoples indigenous to the area, who understand fish consumption to be a non-negotiable lifeway, constitutive of their very identity as fishing peoples.³⁵⁴

Rather than undertake a sober discussion whether we as a society can support these consequences—whether we can tolerate a particular instance of distributive injustice, a particular affront to human dignity or cultural integrity—decisions made by means of cost-benefit analysis are made

350. Cranor, *supra* note 299, at 824.

351. BLACK LEADERSHIP FORUM ET AL., *supra* note 256; LEAGUE OF UNITED LATIN AM. CITIZENS, *supra* note 256.

352. Cranor, *supra* note 307.

353. RUTH SECHENA ET AL., ASIAN AND PACIFIC ISLANDER SEAFOOD CONSUMPTION STUDY 1 (1999), available at <http://www.epa.gov/r10earth/offices/oea/risk/a&pi.pdf>; see generally NEJAC FISH CONSUMPTION REPORT, *supra* note 103, at 92 (documenting that it is an economic necessity for some groups to fish).

354. See O’Neill, *Variable Justice*, *supra* note 109, at 38–42 (describing the cultural importance of fish, especially salmon, to the various Native peoples of the Pacific Northwest).

without reference to who is affected and without reference to what is at stake *from their perspective*. We are, indeed, shielded from identifying information and so deprived of any ability even to attempt to understand fully these consequences. Instead, cost-benefit analysis sanitizes the result, assuring us that “society” is better off, declining even to entertain questions of distribution and generally glossing over the fact that the losers do not actually get compensated (if indeed compensation were possible for what is lost here).

With risk avoidance on the table, moreover, the point that cost-benefit analysis obscures the role that risk regulation plays in adjudicating between competing worldviews is all the more troubling. Decisions in this context effectively instate one set of values—one culturally partisan vision of the good—while denigrating others. As I have observed elsewhere, the degree to which particular risk avoidance proposals seem promising or perilous depends importantly on the value attached to the practice we would be asked to forego and the ease or anguish occasioned by the prescribed avoidance measure.³⁵⁵ Risk reduction is likely to be preferred where the practice that exposes humans to risk is viewed as laudable, natural, or important to living a human life, and where the possible means of avoidance are understood to occasion profound loss or abridge fundamental rights.³⁵⁶ Risk avoidance, by contrast, is likely to be enlisted where the practice is not valued or is viewed as unnecessary, and where avoidance can be easily and cheaply undertaken.³⁵⁷ These determinations respecting importance, necessity, possibility, and ease, are, of course, judgments of value—judgments about which there are often considerable disagreements. Moreover, there is likely to be disagreement as between members of the dominant society and members of some of the various groups who are prominent among the risk-bearers.³⁵⁸ Where this is so, it seems particularly important to make explicit the function that decisions about risk avoidance have in selecting among the alternative worldviews. Indeed, Kahan and his co-authors argue that we need a mode of regulatory discourse that “deflect[s] the ambitions of competing cultural groups to claim the law as theirs and theirs alone.”³⁵⁹ They observe that while the cultural evaluator model that they propose extinguishes one basis for interfering with the public’s market and political evaluations of risk, i.e., that these evaluations are sometimes irrational, it introduces another: that public evaluations

355. O’Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13.

356. *Id.* at 28–29.

357. *Id.* at 29.

358. *Id.*

359. Kahan et al., *supra* note 338, at 1109.

“sometimes reflect an unjust desire to use . . . law to advance culturally imperialist ends.”³⁶⁰

How might we ensure that we evaluate a move to risk avoidance fully cognizant of the value judgments that are in play? How might we ensure that we reflect upon the morally salient attributes of each risk? The next section ventures some suggestions to this end.

B. Evaluating Risk Avoidance

A shift to risk avoidance must be judged against the backdrop of an enduring collective commitment to risk reduction—and to the myriad commitments (e.g., to intergenerational justice, to ecological health, and to honor in upholding treaty promises) subsumed therein. Specifically, a shift to risk avoidance must be assessed in view of the raft of perils detailed above. To be sure, proponents have a hard row to hoe. Still, there may sometimes be a place for risk avoidance measures, and the task for decision makers is to develop a mode of analysis that will enable us to evaluate the merits of risk avoidance in any particular instance. Although it is beyond the scope of this Article to propose a full-blown evaluative tool, I nonetheless offer some considerations for conducting a full and fair debate on risk avoidance.

1. Account Completely for the Costs of Avoidance

Because claimed cost savings are the engine behind most calls for risk avoidance, it is important that the full costs of avoidance be included in any accounting. Although regulatory costs are relatively amenable to quantification,³⁶¹ decision makers have managed a particularly partial accounting when avoidance is on the table. The figures currently cited in favor of a move to risk avoidance would likely be less impressive were they to incorporate the full costs of communicating, implementing, and enforcing the risk avoidance measure—and of doing so in perpetuity. In fact, as noted above, it may be that once these costs of avoidance were accounted for, risk avoidance in many cases would actually be more costly than risk reduction—and the calls for avoidance would subside. For instance, the figures cited tend not to reflect costs stemming from adverse

360. *Id.* at 1107.

361. See, e.g., Thomas O. McGarity & Ruth Ruttenberg, *Counting the Cost of Health, Safety, and Environmental Regulation*, 80 TEX. L. REV. 1997, 2000 (2002) (observing that, while the benefit side of a typical cost-benefit analysis is “laden with uncertainties,” the cost side is thought to be less so, but finding that agencies’ *ex ante* estimates of regulatory costs “have usually been high, sometimes by an order of magnitude, when compared to actual costs incurred”).

effects on human health that result indirectly from contamination left undiminished (not to mention adverse effects to ecological health).³⁶² Nor do the figures tend to account for the costs of any human health risks introduced when risk-bearers adopt alternative practices or lifeways.³⁶³ Nor do they account for the fact that opting for risk avoidance in any particular instance may draw down the store of possibilities for avoidance in the future.³⁶⁴ Note that, to the extent that many of these costs will be felt in a matter of years or decades, the impact of discounting may be large, in some instances virtually determining the bottom line.³⁶⁵ Arguably, there is no reason morally to treat with less dignity the lives and prospects of future generations by virtue of this device.³⁶⁶ At the very least, any accounting should present the costs both with and without the application of various discount rates. Finally, when comparing the costs of reduction versus avoidance, one must subtract from each tally the economic gains generated, e.g., through jobs created, by the strategy chosen. As a general matter, the costs of avoidance need to be understood holistically and accounted for completely.

2. Make Explicit Limitations in Efficacy

At present, risk avoidance does not deliver “the same amount of human health protection” (even understood in its narrowest sense) as risk reduction, because risk avoidance measures are not 100% effective.³⁶⁷ Agencies are far from achieving—and, for the reasons outlined above, may never achieve—complete compliance. This fact needs to be made explicit any time risk avoidance is contemplated. More specifically, the data relevant to the efficacy of particular avoidance measure(s) at issue need to be publicized, including data indicating who is not being reached or is declining to comply with advisories and who is left unprotected when institutional controls are not enforced. It may be that an apparent lack of compliance is a fully informed exercise of autonomy, but it may be that the only ones whose autonomy is being “respected” turn out to be those who

362. See discussion *supra* Part II.C.1.

363. *Id.*

364. See discussion *supra* Part II.C.5.

365. See, e.g., Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 945 (1999) (explaining that many “environmental problems produce harms with a latency period whereas others affect future generations”); Lisa Heinzerling, *Environmental Law and the Present Future*, 87 GEO. L.J. 2025, 2026 (1999) (describing the impact of accounting techniques that “discount the importance of future harms relative to present ones”).

366. See, e.g., ACKERMAN & HEINZERLING, *supra* note 135, at 179–203.

367. See discussion *supra* Part II.C.2.

are likely not to understand the relevant warnings, or those who have historically been subjected to discrimination.³⁶⁸ In general, all of this information needs to be disclosed, so that the competing claims can be assessed with an eye toward what they mean to real people in the real—rather than an ideal—world.

3. Deliberate in Light of Who Is Affected, What Is at Stake

A move to risk avoidance in any particular instance needs to be the product of considered public deliberation, framed to elicit reflection upon whether a risk and its attendant means of avoidance are morally, culturally, and socially acceptable. Specifically, a shift to risk avoidance needs to be the product of deliberation in light of who is affected and what is at stake. Given that risk avoidance focuses on the point of exposure and so requires decision makers to gather information describing those exposed, we will know in advance who would be asked to undertake avoidance. Regulatory ends that are premised on—and legitimized by—the assumption that we do not have this identifying information (and so are all theoretically equally likely to be among those asked to undertake avoidance) are a poor fit in this context. So, too, are decisional tools such as cost-benefit analysis that evaluate tradeoffs in terms of identityless, statistical lives.

Instead, agencies need to reveal information identifying those likely to be asked to undertake avoidance. This information is necessary for an evaluation of the distributive impacts of any proposal for avoidance. This information is also a prerequisite to an assessment of several other morally salient features of a risk and its attendant possibilities for avoidance. It is only when we know who it is that will be asked to undertake avoidance that we can begin to discern whether they consider exposure to the risk to be voluntary or involuntary; whether they understand the pursuits that entail risk to be central or peripheral to their life plans; whether they think they could avoid the risk readily or only with difficulty.³⁶⁹ Relatedly, if the possible means of avoidance are several, it will be important to discern whether they view one or some among the options as plausible. Information identifying those left to undertake avoidance is relevant for other reasons as well. If those most exposed turn out disproportionately to be members of certain groups, this may affect our assessment of any autonomy and responsibility arguments that might be offered on behalf of

368. See discussion *supra* Part II.C.3

369. Other features of a risk and its possibilities for avoidance may be relevant as well; this list, drawn from Cranor's work, however, seems like a good starting point. Cranor, *supra* note 307, at 818–24.

risk avoidance. If the risk-bearers turn out in large part to be children, for example, our willingness to assign responsibility to them to avoid the risks they face might be significantly decreased. Indeed, depending on the identity of the affected group, an array of normative and positive legal commitments may be implicated, a point taken up in the next section.

Generally, decisions about whether to employ risk avoidance ought to be framed so as to encourage reflection upon the larger questions that are in fact at stake. Is it a good idea to opt for risk avoidance where it means that future generations may be left with no fish that are safe to eat? Where it means that millions of us will be confined indoors in the summer? Where it means that a host of longstanding human activities will be ushered out? We need to ask and answer these questions. Ultimately, we need to decide, collectively, whether this is the kind of world in which we wish to live. Finally, the fact that important values are implicated ought not to be downplayed or obscured, lest disputes over these values be adjudicated by default. To the contrary, in order to be supportable, decisions respecting risk avoidance must be made with full knowledge of what is getting resolved in the process.

4. Eschew Avoidance Where It Abridges Important Rights or Values

Risk avoidance should be eschewed where it will encroach upon important rights or profoundly held values. Although this injunction is already likely to be followed where the rights or values at issue belong to members of the dominant society, it is less likely to be observed where the rights or values belong to non-dominant groups and their members.³⁷⁰ In particular, as I have argued elsewhere, risk avoidance will often simply be unacceptable where American Indian tribes and their members, communities of color, and low-income communities are disproportionately among those called upon to undertake avoidance.³⁷¹ This claim is supported by an array of normative and positive legal commitments. It will sometimes be the case that risk avoidance would run afoul of societal commitments to address what might be termed *exclusionary discrimination*—discrimination that imposes burdens on members of non-dominant groups, burdens that are not suffered by members of dominant or

370. See, e.g., GUIDO CALABRESI, IDEALS, BELIEFS, ATTITUDES, AND THE LAW: PRIVATE LAW PERSPECTIVES ON A PUBLIC LAW PROBLEM 18–19 (1985) (discussing the role of individuals' ideals, beliefs, and attitudes arising from cultural differences in societal assessments of the "reasonableness" of their behavior); O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 3–4 (noting that "the burden of undertaking avoidance is unlikely to fall on members of the dominant society").

371. O'Neill, *Risk Avoidance and Indigenous Peoples*, *supra* note 13, at 25.

majority groups.³⁷² At other times, it will be the case that risk avoidance would run afoul of societal commitments to address what might be termed *cultural discrimination*—discrimination that works to suppress or obliterate cultural bonds by stifling the expression of non-dominant or minority groups' cultures.³⁷³ These commitments are also enshrined in positive law. Depending on the group affected, risk avoidance may run up against protections flowing from the U.S. Constitution, treaties, the federal trust responsibility, civil rights statutes, and executive commitments to environmental justice.³⁷⁴

5. Cabin Risk Avoidance

Where risk avoidance is selected, it needs to be held to the terms under which it is authorized. Where it is sanctioned initially as a temporary measure, risk avoidance needs to be limited in duration. In the (presumably rarer) instances in which risk avoidance is selected as a longer-term measure, it needs to be held to its terms—and these terms should be revisited periodically. Given that it takes time to reduce or clean up contamination, risk avoidance might appropriately be undertaken as an interim measure, designed to inform those exposed and to mitigate the human health impacts—while risk reduction is pursued in earnest. In the case of methylmercury contamination, for example, even serious efforts to reduce mercury emissions would take anywhere from a few months to a few years to net results in the form of reduced methylmercury in aquatic environments and, ultimately, in fish tissue.³⁷⁵ And in the case of a handful of pollution problems—mainly stemming from large-scale past releases of contaminants, such as the dispersal of PCBs over many miles of the Hudson River or the broadcast of arsenic throughout the southern Puget Sound as a result of copper smelting at the ASARCO facility in Tacoma, Washington—reduction efforts will likely reasonably take decades.³⁷⁶ In

372. I am indebted to Jim Anaya for his explication of discrimination relevant to ethnocultural groups, among them Native peoples, as consisting of both exclusionary and cultural discrimination. See Anaya, *supra* note 230, at 227–29. Exclusionary discrimination might also impede non-dominant group members' realization of the benefits and privileges commonly enjoyed by members of majority or dominant groups. *Id.*

373. Anaya, *supra* note 230, at 228.

374. See, e.g., O'Neill, *Variable Justice*, *supra* note 109, at 100–16 (discussing legal obligations under treaties, the federal trust responsibility, civil rights statutes, and executive commitments); O'Neill, *Protecting the Tribal Harvest*, *supra* note 41 (discussing legal obligations under treaties, the Equal Protection Clause, and civil rights statutes).

375. See, e.g., O'Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,091–92 (discussing the relatively rapid ecological responses that would be expected from reductions in mercury emissions).

376. See U.S. ENV'T'L PROT. AGENCY, HUDSON RIVER PCBs SITE, NEW YORK: RECORD OF

the meantime, it is vital that those exposed be made aware of the nature and extent of the contamination, the consequences for human and ecological health, the possibilities for avoidance, and, ideally, any opportunities to facilitate reduction.³⁷⁷

However, the need to inform the public in the meantime—to respect their “right to know”—should not be used as cover for increased reliance on risk avoidance.³⁷⁸ And the need temporarily to lean on risk avoidance should not be taken to authorize risk avoidance for the duration. As noted above, agencies have now relied on fish consumption advisories and ozone alerts for decades as pollution control efforts lag. Important headway could be made, of course, simply by holding agencies to their statutory duties and deadlines.

Ideally, where risk avoidance is selected, it would be authorized for a discrete period and under specified terms (e.g., that regulations are issued on time and that cleanup is pursued expeditiously), with a sunset provision requiring additional deliberation for any renewal periods. As part of this periodic deliberation, any changing circumstances affecting the possibilities for reduction and avoidance (e.g., technological innovations that render reduction less costly and toxicological information that renders risk avoidance more problematic) should be considered. As a corollary, regulatory strategies that incorporate avoidance ought to be fashioned, to the extent feasible, so as not to foreclose future options for reduction; this

DECISION (undated document), available at <http://www.epa.gov/hudson/RecordofDecision-text.pdf> (discussing cleanup remedies for PCB contamination in the Hudson River); ENVTL HEATH DIV., PUBLIC HEALTH—SEATTLE & KING COUNTY, FINAL REPORT: VASHON MAURY ISLAND SOIL STUDY 1999-2000 (2000), available at <http://metrokc.gov/health/hazard/finalrpt72500.pdf> (documenting arsenic contamination in soils on islands downwind of the former ASARCO Copper Smelter and beyond the boundaries of ongoing Superfund cleanup in the immediate vicinity of a former smelter).

377. Ideally, advisories would inform the public how they might weigh in on ongoing debates involving the pollution problems that give rise to advisories. In addition, to the extent that humans are the sources of the relevant environmental contaminants as well as the receptors, advisories would include information about how to reduce their contribution. See generally Vandenberg, *supra* note 141 (asserting that humans ought to be held accountable for their role as sources of pollutants). Note that some ozone alerts include information of the latter sort, identifying ways that people can engage in risk reduction efforts (e.g., by refueling vehicles after sundown; by refraining from using gasoline-powered lawn and garden equipment; and by reducing driving and idling time). See, e.g., REGION 5, U.S. ENVTL. PROT. AGENCY, OZONE ACTION DAY, available at <http://www.epa.gov/ARD-R5/ozoneday/ozoneday.htm> (listing ten things people can do to reduce ground-level ozone formation).

378. See, e.g., O'Neill, *Mercury, Risk, and Justice*, *supra* note 17, at 11,107 n.388 (describing the National Mining Association's efforts to portray the Environmental Defense Fund's (EDF) “Seafood Selector,” an on-line resource publicizing existing fish consumption advisories, as evidence that “the environmental community is becoming increasingly aware that dietary modification and education are the keys to an effective mercury risk management strategy,” where the EDF elsewhere makes clear that it advocates risk reduction rather than risk avoidance for mercury contamination).

will be particularly important for those pollution problems that appear at present to be intractable or solvable only at extraordinary cost.

CONCLUSION

The single-minded pursuit of (a certain brand of) rationality in risk regulation threatens to undermine our ability to make considered decisions about the kind of society we wish to be and the kind of world in which we wish to live. In this quest for rationality, questions are framed in ways that narrow our field of vision, while claiming to introduce reason: ground-level ozone pollution is a benefit, because it shields against harmful ultraviolet radiation—never mind that such protection is necessitated in the first place by anthropogenic contributions to the diminishing stratospheric ozone layer.³⁷⁹ In this quest for rationality, decisional tools are enlisted that make bold judgments of value, while purporting to be neutral arbiters: methylmercury contamination is a good thing, because it enables society to save the money it would have to spend to educate children were their neurological systems not impaired.³⁸⁰

The case for risk avoidance appears to rest primarily on the claim that it can provide “the same amount of human health protection” for less money than current risk reduction approaches. As such, it invokes just this brand of rationality and invites just the sort of calculus that fails to encompass much of what is at stake in a decision whether to rely on risk avoidance. Although risk avoidance may seem promising in some instances, it is also perilous. We need as a society to develop a mode of analysis that does not obscure what is at stake and for whom. We need to frame the debate so that it considers the larger question of whether a given risk and its attendant possibilities for avoidance are morally, culturally, and socially acceptable. In the end, we need to reflect upon the very basic question of whether this is the direction we wish to take environmental law and policy: whether we wish to shape a world in which our children can no longer make mud pies.

379. See generally *Am. Trucking Ass'ns v. Env'tl Prot. Agency*, 175 F.3d 1027, 1051–53 (D.C. Cir. 1999), *aff'd in part and rev'd in part*, *Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457 (2001).

380. EPA, CAMR RIA, *supra* note 330, at 10-46 to 10-47.