

**IT MIGHT HAVE BEEN: RISK, PRECAUTION AND
OPPORTUNITY COSTS**

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I.	INTRODUCTION.....	1
II.	THE PROBLEM OF UNCERTAINTY.....	12
	<i>A. Complexity</i>	14
	<i>B. Catastrophe</i>	20
	<i>C. Procedural Rationality</i>	23
III.	THE PROBLEM OF VALUATION.....	28
	<i>A. Emergence</i>	30
	<i>B. Membership</i>	33
	<i>C. Discursive Rationality</i>	39
IV.	THE PROBLEM OF AGENCY.....	42
	<i>A. Partiality</i>	44
	<i>B. Collectivity</i>	48
	<i>C. Moral Rationality</i>	52
V.	CONCLUSION	56

I. INTRODUCTION

In a 1959 lecture, the late physicist Richard Feynman famously observed that, in principle, nothing prevents “the possibility of [humans] maneuvering things atom by atom.”¹ Today, the scientific field that Feynman foresaw—nanotechnology—not only exists, but receives over one billion dollars in federal funding per year for

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1. Richard P. Feynman, *There’s Plenty of Room at the Bottom*, ENG. & SCI. (1960).

research in fields as varied as mechanical and electrical engineering, biology, medicine, information technology, optics, and cognitive science.² Speculation by popular commentators about what this research ultimately will mean for humanity ranges from a utopian vision of boundless energy and zero pollution to a “gray goo” nightmare of self-replicating nanodevices that cause incomprehensibly vast material destruction.³

Even among expert observers, opinions of nanotechnology vary widely in their tone and content. A committee convened by the U.S. National Research Council, for instance, breathlessly predicted that “[w]ith potential applications in virtually every existing industry and new applications yet to be discovered, nanoscale science and technology will no doubt emerge as one of the major drivers of economic growth in the first part of the new millennium.”⁴ In contrast, given the dearth of knowledge presently available regarding human health and environmental consequences of nanomaterials, a report issued in Britain by The Royal Society and The Royal Academy of Engineering recommended “as a precautionary measure that factories and research laboratories treat manufactured nanoparticles and nanotubes as if they were hazardous.”⁵

Although it would be easy to overstate the distinction between U.S. and European approaches to risk regulation,⁶ it is neverthe-

2. The 21st Century Nanotechnology Research and Development Act, passed in 2003, allocates nearly \$3.7 billion to nanotechnology research from 2005 to 2008, not including substantial expenditures on defense related nanoscale research.

3. Compare Lynn L. Bergeson & Bethami Auerbach, 21 ENVTL. FORUM 30, 32 (March/April 2004) (calling nanotechnology “perhaps the ultimate sustainable development tool”) and Gary Stix, *Little Big Science*, SCI. AMERICAN 32, 37, Sept. 16, 2001 (“If the nano concept holds together, it could, in fact, lay the groundwork for a new industrial revolution.”), with Bill Joy, *Why the Future Doesn't Need Us*, WIRED, August 4, 2000, available at http://www.wired.com/wired/archive/8.04/joy_pr.html (discussing the “gray goo” problem and asserting that “[o]ur most powerful 21st-century technologies - robotics, genetic engineering, and nanotech - are threatening to make humans an endangered species.”). See also Glenn Harlan Reynolds, *Environmental Regulation of Nanotechnology*, 31 ENVTL. L. REP. 10681, 10681 (2001) (noting that predictions of the environmental implications of nanotechnology range from “the most radical of the green visions” to the “worry that rogue nanodevices will devour the planet”).

4. COMMITTEE FOR THE REVIEW OF THE NATIONAL NANOTECHNOLOGY INITIATIVE, DIVISION ON ENGINEERING AND PHYSICAL SCIENCES, NATIONAL RESEARCH COUNCIL, SMALL WONDERS, ENDLESS FRONTIERS: A REVIEW OF THE NATIONAL NANOTECHNOLOGY INITIATIVE 2 (2002).

5. See, e.g., THE ROYAL SOCIETY AND THE ROYAL ACADEMY OF ENGINEERING, NANOSCIENCE AND NANOTECHNOLOGIES: OPPORTUNITIES AND UNCERTAINTIES, Summary 5 (July 2004).

6. As Jonathan Wiener has noted, the common perception that the United States tends to favor more permissive policies than the European Union overlooks important exceptions and nuances—witness, for instance, the stronger European embrace of nuclear power or the greater U.S. willingness to deter public smoking. See Jonathan B. Wiener, *Whose Precaution After All? A Comment on the Comparison and Evolution of Risk Regulatory Systems*, 13 DUKE J. COMP. & INT'L L. 207, 229 (2003). See also Jonathan B. Wiener & Michael D. Rogers, *Comparing Precaution in the United States and Europe*, 5 J. RISK RES.

less striking how the reports of these respective national agencies appear to reinforce the common perception that U.S. experts and policymakers today favor less conservative environmental, health, and safety measures than their European counterparts. The British scientific societies, for instance, called for a national prohibition on “the use of free nanoparticles in environmental applications such as remediation of groundwater,”⁷ pending development of better scientific information and understanding regarding the potential consequences of such releases. Researchers in the United States, on the other hand, already are engaging in field releases of nanoparticles in hopes of uncovering substances capable of remediating pollution.⁸ Similarly, a European Union scientific committee carefully scrutinized the health risks of sunscreen products that contain free nanoparticles, ultimately refusing to approve microfine zinc oxide for use as a UV filter in light of suggestive evidence that the substance might pass through the skin and damage DNA.⁹ During the U.S. Food and Drug Administration (FDA)’s review of nanoparticle-containing sunscreens, on the other hand, the agency confidently opined that chemical substances shown to be safe at the macroscale also can be assumed, without further investigation, to be safe at the nanoscale.¹⁰

This apparent difference in regulatory attitude between the United States and Europe often is said to emerge from the jurisdictions’ contrasting stances toward two policymaking paradigms that compete for acceptance within environmental, health, and safety regulation: One—known as cost-benefit analysis (CBA) and increasingly associated with the United States¹¹—strives to enhance social welfare by predicting, weighting, and aggregating all relevant consequences of policy proposals in order to identify those

317 (2002). Such ready counterexamples notwithstanding, there remains an important sense in which U.S. and European policymakers believe themselves to be engaged in a debate over appropriate regulatory approaches going forward. *See, e.g.*, ARIE TROUWBORST, *EVOLUTION AND STATUS OF THE PRECAUTIONARY PRINCIPLE IN INTERNATIONAL LAW* 82 (2002) (describing U.S.-led opposition to inclusion of the PP in the international convention on persistent organic pollutants on the basis that the principle was “unscientific”); *id.* at 138 (describing U.S. opposition to reliance on the PP within a report on risk analysis principles and guidelines at the Codex Alimentarius Commission). Explicating the theoretical and practical differences of these approaches therefore remains a significant exercise, regardless of how closely U.S. and European regulations and attitudes in the past conform to the common stereotype.

7. THE ROYAL SOCIETY AND THE ROYAL ACADEMY OF ENGINEERING, *supra* note 5, at 5.

8. *See* Wei-Xian Zhang, *Nanoscale Iron Particles for Environmental Remediation: An Overview*, 5 J. NANOPARTICLE RES. 323, 32 (2003).

9. *See* SCCNFP, *Opinion Concerning Zinc Oxide (Colipa nS76)*. SCCNFP/0690/03, available at http://ec.europa.eu/health/ph_risk/committees/sccp/documents/out222_en.pdf.

10. *See* FDA, 64 Fed. Reg. 27666, 27671 (1999).

11. *See* CASS R. SUNSTEIN, *THE COST-BENEFIT STATE* ix (2002) (“Gradually, and in fits and starts, American government is becoming a cost-benefit state.”) [hereinafter SUNSTEIN, *THE COST-BENEFIT STATE*].

choices that represent welfare-maximizing uses of public resources; the other—associated with the precautionary principle (PP) and the European approach to risk regulation¹²—eschews optimization in favor of more pragmatic forms of decisionmaking. One oft-cited articulation of the PP, for instance, seeks to trigger an incremental process of risk regulation through the simple admonition, “When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”¹³

Despite the efforts of numerous scholars to forge a middle path between these extremes of “comprehensive rationality and

12. See, e.g., Treaty on European Union, Official Journal C 191, 29 July 1992, at art. 130r(2) (stating that EC environmental policy “shall be based on the precautionary principle”); Commission of the European Community, *Communication from the Commission on the Precautionary Principle*, February 2, 2000, available at http://europa.eu.int/comm/dgs/health_consumer/library/pub/pub07_en.pdf. See also Robert W. Hahn & Cass R. Sunstein, *The Precautionary Principle as a Basis for Decisionmaking*, *The Economist’s Voice*, Vol. 2, No. 2, Article 8 (2005) [hereinafter Hahn & Sunstein, *Basis for Decisionmaking*] (noting that “[t]he European Union has taken a leadership role in promoting the precautionary principle as a basis for making decisions on environmental policy and other areas”); Cass R. Sunstein, *Precautions Against What? The Availability Heuristic and Cross-Cultural Risk Perceptions 1-2* (Univ. Chicago John M. Olin Law & Econ. Working Paper No. 220, 2d Series, 2004) [hereinafter Sunstein, *Precautions Against What?*] (observing that “[i]t has become standard to say that with respect to risks, Europe and the United States can be distinguished along a single axis: Europe accepts the Precautionary Principle, and the United States does not”); Gail Charnley & E. Donald Elliott, *Democratization of Risk Analysis, in HUMAN AND ECOLOGICAL RISK ASSESSMENT: THEORY AND PRACTICE 1399, 1401* (Dennis J. Paustenbach ed., 2002) (“When Europeans call for decisions based on ‘the precautionary principle’ in international forums, they are challenging the core premise of the American legal culture.”).

13. Peter Montague, *The Precautionary Principle*, RACHEL’S ENV’T & HEALTH WKLY., Feb. 18, 1998, at 1, available at http://www.rachel.org/bulletin/bulletin.cfm? Issue_ID=532 (describing and quoting the 1998 Wingspread Declaration). See also 1991 Convention on the Ban of Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa, art. 3(f), available at www.ban.org/library/bamako_treaty.html (requiring implementation of “the precautionary principle to pollution prevention through the application of clean production methods, rather than the pursuit of a permissible emissions approach based on assimilative capacity assumptions”). Other formulations of the PP do not contain an affirmative requirement to undertake precautionary measures. Instead, they simply state that scientific uncertainty by itself should not be taken to weigh against the adoption of precautionary measures. See, e.g., United Nations Conference on Environment and Development: Convention on Biological Diversity, prmb., 31 I.L.M. 818, 822 (1992) (declaring that “where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat”). It is sometimes argued that this interpretation of the PP is a mere ‘truism’ that should be uncontroversial. Proponents of this version of the principle, however, offer their seemingly trivial reminder in response to “the self-interested claims of private groups demanding unambiguous evidence of harm” before environmental, health, and safety regulations are imposed. Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1016 (2003). Such claims have proven surprisingly successful in many policy debates (including especially the U.S. climate change debate), despite the fact that “no rational society requires” full certainty before acting. *Id.* at 1016-17.

incrementalism,”¹⁴ today the debate over CBA and the PP in the environmental, health, and safety context remains as polarized as ever. On the one hand, several influential commentators—including Matthew Adler and Eric Posner,¹⁵ Kenneth Arrow,¹⁶ Justice Stephen Breyer,¹⁷ Judge Richard Posner,¹⁸ Cass Sunstein,¹⁹ and others²⁰—have come to the conclusion that the normative case in favor of CBA is simply overwhelming and that competing paradigms such as the PP are either incoherent or inappropriate as frameworks for risk regulation. The conclusion of these thinkers is particularly notable in light of their acknowledgment that CBA suffers from a number of conceptual and practical limitations of its own. Nevertheless, CBA’s proponents increasingly believe that the “first generation debate” about the procedure’s normative desirability is over and that today the important questions concern “second generation” issues of how best to implement CBA in the environmental, health, and safety regulation context.²¹ The basic

14. Colin S. Diver, *Policymaking Paradigms in Administrative Law*, 95 HARV. L. REV. 393, 395 (1981). For examples of scholarship aiming to bridge the divide between the PP and CBA, see DANIEL A. FARBER, *ECO-PRAGMATISM: MAKING SENSIBLE ENVIRONMENTAL DECISIONS IN AN UNCERTAIN WORLD* (1999); J. B. Ruhl, *A Manifesto for the Radical Middle*, 38 IDAHO L. REV. 385, 385-86 (2002); J. B. Ruhl, *Working Both (Positivist) Ends Toward a New (Pragmatist) Middle in Environmental Law*, 68 GEO. WASH. L. REV. 522, 524 (2000) (reviewing DANIEL A. FARBER, *ECOPRAGMATISM: MAKING SENSIBLE ENVIRONMENTAL DECISIONS IN AN UNCERTAIN WORLD* (1999)); Symposium, *The Pragmatic Ecologist: Environmental Protection as a Jurisdynamic Experience*, 87 MINN. L. REV. 847 (2003).

15. See Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 YALE L. J. 165 (1999).

16. See Kenneth J. Arrow et al., *Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?*, 272 SCIENCE 221 (1996); Kenneth J. Arrow & Robert C. Lind, *Uncertainty and the Evaluation of Public Investment Decisions*, 60 AM. ECON. REV. 364, 366-67 (1970).

17. STEPHEN BREYER, *BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION* (1993).

18. RICHARD A. POSNER, *CATASTROPHE: RISK AND RESPONSE* (2004) [hereinafter, POSNER, *CATASTROPHE*]; Richard A. Posner, *Cost-Benefit Analysis: Definition, Justification, and Comment on Conference Papers*, 29 J. LEGAL STUD. 1153 (2000).

19. See SUNSTEIN, *THE COST-BENEFIT STATE*, *supra* note 11; CASS R. SUNSTEIN, *LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE* (2005) [hereinafter SUNSTEIN, *LAWS OF FEAR*]; CASS R. SUNSTEIN, *RISK & REASON: SAFETY, LAW, AND THE ENVIRONMENT* (2002) [hereinafter SUNSTEIN, *RISK & REASON*]; Sunstein, *Beyond the Precautionary Principle*, *supra* note 13; Cass R. Sunstein, *Cognition and Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1059 (2000); Cass R. Sunstein, *Cost-Benefit Default Principles*, 99 MICH. L. REV. 1651 (2001).

20. See, e.g., Mark Geistfeld, *Reconciling Cost-Benefit Analysis With the Principle That Safety Matters More Than Money*, 76 N.Y.U. L. REV. 114 (2001); Robert H. Frank, *Why Is Cost-Benefit Analysis So Controversial?*, 29 J. LEGAL STUD. 913 (2000); W. Kip Viscusi, *Regulating the Regulators*, 63 U. CHI. L. REV. 1423 (1996).

21. SUNSTEIN, *THE COST-BENEFIT STATE*, *supra* note 11, at xi. See also SUNSTEIN, *RISK & REASON*, *supra* note 19, at 5-6 (asserting that “‘first-generation’ debate about whether to base regulatory choices on cost-benefit analysis at all. . . is now ending, with a substantial victory for the proponents of cost-benefit analysis”); Hahn & Sunstein, *Basis for Decision-making*, *supra* note 12, at 6 (“We do not believe there is any principled way of making policy

superiority of CBA as a policy tool for risk regulation, in other words, is no longer seriously doubted.

Except, of course, that it is, and not just by the “environmental Darth Vader[s]” of the world,²² but by serious, thoughtful observers of the administrative state.²³ For instance, Frank Ackerman and Lisa Heinzerling maintain that regulatory CBA as commonly practiced is flawed for at least four critical reasons: “[T]he standard economic approaches to valuation are inaccurate and implausible; the use of discounting [to compare intertemporal costs and benefits] improperly trivializes future harms and the irreversibility of some environmental problems; the reliance [of CBA] on aggregate, monetized benefits excludes questions of fairness and morality; and the value-laden and complex cost-benefit process is neither objective nor transparent.”²⁴ Moreover, the response of some CBA proponents to call for a “modest, nonsectarian”²⁵ brand of cost-benefit calculation in light of these arguable shortcomings does not satisfy thinkers such as Ackerman and Heinzerling. In their view, CBA’s flaws render the procedure irredeemable as a device for setting standards of environmental, health, and safety protection.²⁶ Accordingly, they applaud the fact the precautionary approach continues to enjoy more prominence and support than CBA outside of U.S. academic and policy cir-

decisions without making the best possible effort to balance all the relevant costs of a policy against the benefits.”).

22. Alex Kozinski, *Gore Wars*, 100 MICH. L. REV. 1742, 1767 (2002) (reviewing BJØRN LOMBORG, *THE SKEPTICAL ENVIRONMENTALIST: MEASURING THE REAL STATE OF THE WORLD* (2001)).

23. See, e.g., FRANK ACKERMAN & LISA HEINZERLING, *PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING* (2004) [hereinafter ACKERMAN & HEINZERLING, *PRICELESS*]; SIDNEY A. SHAPIRO & ROBERT L. GLICKSMAN, *RISK REGULATION AT RISK: RESTORING A PRAGMATIC APPROACH* (2003); David M. Driesen, *The Societal Cost of Environmental Regulation: Beyond Administrative Cost-Benefit Analysis*, 24 *ECOLOGY L.Q.* 545 (1997); Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification*, 56 *VAND. L. REV.* 653 (2003); Gregory C. Keating, *Pricelessness and Life: An Essay for Guido Calabresi*, 64 *MD. L. REV.* 159 (2005); Thomas O. McGarity, *A Cost-Benefit State*, 50 *ADMIN. L. REV.* 7 (1998); Thomas O. McGarity, *The Goals of Environmental Legislation*, 31 *B.C. ENVTL. AFF. L. REV.* 529 (2004) [hereinafter McGarity, *Goals*]; Thomas O. McGarity, *MTBE: A Precautionary Tale*, 28 *HARV. ENVTL. L. REV.* 281 (2004) [hereinafter McGarity, *MTBE*]; Thomas O. McGarity & Ruth Ruttenberg, *Counting the Cost of Health, Safety, and Environmental Regulation*, 80 *TEX. L. REV.* 1997 (2002); Amy Sinden, *Cass Sunstein’s Cost-Benefit Lite: Economics for Liberals*, 29 *COLUM. J. ENVTL. L.* 191 (2004).

24. Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 *U. PA. L. REV.* 1553, 1563 (2002).

25. Robert W. Hahn & Cass R. Sunstein, *A New Executive Order for Improving Federal Regulation? Deeper and Wider Cost-Benefit Analysis 7* (Univ. Chicago-John M. Olin Law & Econ. Working Paper No. 150, 2002).

26. See ACKERMAN & HEINZERLING, *PRICELESS*, *supra* note 23, at 219-220 (arguing that “the most fundamental problem is not in the details of any particular cost-benefit analysis, but rather in the framing decision about which policies are and which are not subject to such analyses”).

cles²⁷—a fact that critics instead want to attribute to such failings as poor information,²⁸ cognitive error,²⁹ and public hysteria.³⁰

This Article, which is part of a larger project on the competing merits of CBA and the PP,³¹ examines one specific plank of the case against the PP: the claim that the principle's ignorance of the opportunity costs of precaution leads to indeterminate or impoverishing policy advice. Because PP defenders emphasize the limits of human knowledge and the frequency of unpleasant surprises from technology and industrial development, they prefer an *ex ante* stance of precaution whenever a proposed activity meets some threshold possibility of causing severe harm to human health or the environment.³² Importantly, they prefer this stance even in the face of potential benefits—such as those promised by the use of nanoparticles in groundwater remediation or skin protection—that may *themselves* be ameliorative of environmental, health, and safety dangers. Although their reasoning has never been perfectly

27. In addition to its expression in European Union law and in the domestic laws and regulations of many nations outside of the E.U., *see* Treaty on European Union, *supra* note 12, the PP also has appeared in a number of multilateral documents and is even considered by some observers to be a strong candidate for inclusion within customary international law. *See* Nuclear Tests (N.Z. v. Fr.), 1995 I.C.J. 288 (Sept. 22) 342 (Weeramantry, J., dissenting) (noting that the PP is “gaining increasing support as part of the international law of the environment”); *id.* at 412 (Palmer, J., dissenting) (observing that “the norm involved in the precautionary principle has developed rapidly and may now be a principle of customary international law relating to the environment.”); Gabcikovo-Nagymaros Project (Hung. v. Slov.), 1997 I.C.J. 7 (Sept. 25). *See also* F. ORREGA VICUÑA, THE CHANGING INTERNATIONAL LAW OF HIGH SEAS FISHERIES 156 (1999) (“The precautionary principle . . . has taken a central place in the discussion of most international regimes for environmental protection.”); David Freestone & Ellen Hey, *Origins and Development of the Precautionary Principle*, in THE PRECAUTIONARY PRINCIPLE AND INTERNATIONAL LAW: THE CHALLENGE OF IMPLEMENTATION 3, 3 (David Freestone & Ellen Hey eds., 1996) (“[T]he precautionary concept has been included in virtually every recent treaty and policy document related to the protection and preservation of the environment.”).

28. *See* AARON WILDAVSKY, BUT IS IT TRUE?: A CITIZEN’S GUIDE TO ENVIRONMENTAL HEALTH AND SAFETY ISSUES 1-2 (1995).

29. *See* SUNSTEIN, RISK AND REASON, *supra* note 19, at 28-52.

30. *See* Tumor Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683 (1999) (positing that rational risk regulation is confounded by the political pressure exerted by “populist firestorms”).

31. *See* DOUGLAS A. KYSAR, THE POINT OF PRECAUTION: ECONOMICS, THE PRECAUTIONARY PRINCIPLE, AND OUR ENVIRONMENTAL FUTURE (working title for unpublished manuscript, on file with author).

32. The statement in the text captures the essential structure of the PP. *See, e.g.*, TROUWBORST, *supra* note 6, at 52 (“[I]n the presence of a threat of (non-negligible) environmental harm accompanied by scientific uncertainty, regulatory action should nevertheless be taken to prevent or remedy the hazard concerned.”) (emphasis omitted). Important implementation issues then include: (1) the degree of credibility or seriousness of threat required in order to trigger the precautionary obligation; (2) the precise form that regulatory response should take; (3) and the manner in which the regulatory response should be revisited and revised over time. *See* John S. Applegate, *The Taming of the Precautionary Principle*, 27 WM. & MARY ENVTL. L. & POL’Y REV. 13 (2002) [hereinafter Applegate, *Taming*].

clear,³³ advocates of the PP regard such foregone benefits as conceptually distinct from, and somehow less central than, the more affirmative consequences that may result from allowing potentially harmful activities to proceed.

Naturally, this asymmetric aspect of the PP generates strident criticism, particularly from consequentialist-utilitarian thinkers such as those who advocate CBA. Along with substitute risks, lulling effects, and other purportedly overlooked health consequences of precautionary regulation,³⁴ these critics argue that the PP's failure to treat opportunity costs *pari passu* with the primary risks targeted by policy measures is simply indefensible. Moreover, they argue that if opportunity costs of regulation *were* taken into account in the design of the PP, then "the real problem with the principle [would become] that it offers no guidance—not that it is wrong, but that it forbids all courses of action, including regulation."³⁵ To the PP's detractors, therefore, the principle either

33. The classic defense of the PP contends that the benefits of regulatory precaution consist of saved human lives or averted ecological harms, while the costs typically consist of lost economic profits or some other opportunity cost that is not viewed as fully commensurable with human or environmental harm. See Talbot Page, *A Generic View of Toxic Chemicals and Similar Risks*, 7 *ECOLOGY L.Q.* 207, 22 (1978); Sidney A. Shapiro, *Keeping the Baby and Throwing Out the Bathwater: Justice Breyer's Critique of Regulation*, 8 *ADMIN. L.J. AM. U.* 721, 732 (1995); Kristin Shrader-Frechette, *Methodological Rules for Four Classes of Scientific Uncertainty*, in *SCIENTIFIC UNCERTAINTY AND ENVIRONMENTAL PROBLEM SOLVING* 12, 14-15 (John Lemons, ed.) (1995). As noted *infra* text accompanying notes 50-58, this incommensurability defense is partially (but only partially) undermined by the frequent appearance of human lives or ecological assets on *both* sides of the regulatory ledger.

34. For an influential analytical overview and collection of case studies involving such "risk-risk" tradeoffs, see JOHN D. GRAHAM & JONATHAN BAERT WIENER, *RISK VERSUS RISK* (1995).

35. Sunstein, *Precautions Against What?*, *supra* note 12, at 7. See also M. GOKLANY, *THE PRECAUTIONARY PRINCIPLE: A CRITICAL APPRAISAL OF ENVIRONMENTAL RISK ASSESSMENT* (2001); HOWARD MARGOLIS, *DEALING WITH RISK: WHY THE PUBLIC AND THE EXPERTS DISAGREE ON ENVIRONMENTAL ISSUES* 2 (1996) ("Good judgment—judgment that will look reasonable when the passions of the moment have passed—has to deal with what I label the 'fungibility' (between opportunities and dangers) that ordinarily confronts us."); SUNSTEIN, *LAWS OF FEAR*, *supra* note 19, at 42 (observing that precautionary risk regulation tends to lack "concern[] [for] the benefits that are foregone as a result of regulation"); Jonathan B. Wiener, *Precaution in a Multi-Risk World*, in *HUMAN AND ECOLOGICAL RISK ASSESSMENT: THEORY AND PRACTICE* 1509 (Dennis D. Paustenbach ed., 2002); Jonathan H. Adler, *More Sorry Than Safe: Assessing the Precautionary Principle and the Proposed International Safety Protocol*, 35 *TEX. INT'L L. J.* 173, 195 (2000) ("The problem is that by focusing on one set of risks—those posed by the introduction of new technologies with somewhat uncertain effects—the precautionary principle turns a blind eye to the harms that occur, or are made worse, due to the lack of technological development."); Frank B. Cross, *Paradoxical Perils of the Precautionary Principle*, 53 *WASH. & LEE L. REV.* 851 (1996); Howard Margolis, *A New Account of Expert/Lay Conflicts of Risk Intuition*, 8 *DUKE ENVTL. L. & POL'Y F.* 115 (1997); John O. McGinnis, *The Appropriate Hierarchy of Global Multilateralism and Customary International Law: The Example of the WTO*, 44 *VA. J. INT'L L.* 229, 273 (2003) (arguing that "the precautionary principle often remains coherent only by focusing on the risks of action at the expense of those of inaction"); Christopher D. Stone, *Is There a Precautionary Principle?*, 31 *ENVTL. L. REP.* 10790 (2001); Cass R. Sunstein, *Cost-Benefit Analysis and the Environment*, 18 (Univ. Chicago-John M. Olin Law & Econ. Working Paper No. 227, 2d series,

must be expanded to include an obligation to consider the opportunity costs of regulatory activity—in which case it would become woefully indeterminate—or the principle must be rejected as a one-sided tool that is likely to prolong a range of harms that would be alleviated in its absence.

Despite the seemingly unimpeachable logic of this critique, the role of opportunity costs in environmental, health, and safety regulation actually turns out to be much more complicated and interesting than the CBA proponents' account reveals. Undoubtedly, CBA proponents are correct to note that no society should flatly ignore the opportunity costs of precautionary regulation. But this is a trivial observation, for no serious proponent of the PP disagrees with it. Despite frequent caricature of the PP as a crudely asymmetric heuristic,³⁶ PP proponents actually regard the principle as merely one aspect of a much more elaborate regulatory process in which the PP is applied with a view toward proportionality of response³⁷ and adaptability over time.³⁸ Just as no physician would unthinkingly and universally follow the precautionary mandate of the Hippocratic adage—"first, do no harm"—no regulator would adhere to the PP without paying some attention to foregone benefits, new information, and changed circumstances.³⁹ Thus, the proper contrast between CBA and the PP is not one of comprehensive and partial modes of analysis, as critics of the PP assert,⁴⁰ but

2004) available at <http://www.law.uchicago.edu/lawecon/index.html> (arguing that "[w]hen the principle seems to give guidance, it is often because those who use it are focusing on one aspect of risk-related situations and neglecting others."); Cass R. Sunstein & Adrian Vermeule, *Is Capital Punishment Morally Required? The Relevance of Life-Life Tradeoffs*, (Univ. Chicago John M. Olin Law & Econ. Working Paper No. 239, 2005) available at http://ssrn.com/abstract_id=691447 [hereinafter Sunstein & Vermeule, *Capital Punishment*] ("No one believes that for moral reasons, social planners should refuse to take account of [risk-risk] tradeoffs.") (subsequently published as Cass R. Sunstein & Adrian Vermeule, *Is Capital Punishment Morally Required? Acts, Omissions, and Life-Life Tradeoffs*, 58 STAN. L. REV. 703 (2005)).

36. See Applegate, *Taming*, *supra* note 32, at 29 ("Critics of the [PP] often misrepresent its regulatory standard as unitary and draconian: to ban or forgo an activity or technology altogether. Neither the texts of the [PP] nor the writings of its advocates bears this out.")

37. See Commission of the European Communities, Communication from the Commission on the precautionary principle, COM (2000) 1 (Feb. 2, 2000) (emphasis added) [hereinafter Communication from the Commission], available at http://europa.eu/int/comm/dgs/health_consumer/library/pub/pub07_en.pdf.

38. See Joanne Scott, *The Precautionary Principle Before the European Courts*, in PRINCIPLES OF EUROPEAN ENVIRONMENTAL LAW 51, 62, 64 (Richard Macrory et al. eds., 2004) (observing that the PP is applied in a conditional, preliminary fashion that not only allows decisionmakers to "exercise their judgment with respect to risk," but also helps to avoid the possibility that the PP "will threaten paralysis in the manner feared by [critics of the principle]").

39. See *id.*; Communication from the Commission, *supra*, note 37; *infra* text accompanying notes 161-163 (describing various "safety valves" associated with the precautionary approach that allow for relaxation of its dictates in appropriate circumstances).

40. See *supra* note 34.

rather of static and dynamic, optimizing and incremental, formalized and pragmatic decisionmaking models.

As Parts I and II of this Article demonstrate, there are underappreciated benefits to the PP's more modest approach. Specifically, unlike the optimization framework of CBA, which proceeds awkwardly in the absence of fully characterized risks and consensus normative agreement on exogenized choice criteria, the PP's approach reflects great sensitivity to the fact that decisionmaking in the face of many environmental problems demands not only substantive, but also *procedural* and *discursive* rationality. This is particularly the case with regard to the kinds of multidimensional, long-term questions that are raised by the paradigm of sustainable development law,⁴¹ and that reveal cost-benefit optimization to be both analytically and democratically unsatisfactory. Thus, Parts I and II conclude that the most important task presently facing scholars of environmental law is not, as CBA proponents would have it, to further refine the technical details of the optimization paradigm in order to suit the sustainable development challenge. Rather, the task is to reconcile environmental management's need for flexibility and dynamism with democracy's need for meaningful public input. The PP by itself does not resolve such challenges. However, significantly—and in contrast to CBA—it does acknowledge their existence and importance.

Although the critique of CBA offered in Parts I and II is aggressive, the aim is not to persuade readers of the force of any par-

41. See Douglas A. Kysar, *Sustainable Development and Private Global Governance*, 83 TEXAS L. REV. 2109 (2005) [hereinafter Kysar, *Sustainable Development*]. The PP tends to be closely associated with the sustainable development movement. See U.N. Econ. Comm. for Eur. [UN/ECE], *Bergen Ministerial Declaration on Sustainable Development in the ECE Region*, ¶ 7, U.N. Doc.A/Conf.151/PC/10 (May 16, 1990) (“In order to achieve sustainable development, policies must be based on the precautionary principle.”); James Cameron, *The Precautionary Principle*, in TRADE, ENVIRONMENT, AND THE MILLENIUM 239, 287-88 (Gary P. Sampson and W. Bradnee Chambers eds., 2002) (“The precautionary principle is part of a system of rules designed to guide human behavior towards the ideal of an environmentally sustainable economy.”); Tim O’Riordan, Andrew Jordan, & James Cameron, *The Evolution of the Precautionary Principle*, in REINTERPRETING THE PRECAUTIONARY PRINCIPLE 9, 13 (Tim O’Riordan, James Cameron, & Andrew Jordan eds., 2001) (noting that the PP’s “future lies in the debate and policy setting of sustainability, rather than environmentalism”); Michael C. Farmer & Alan Randall, *The Rationality of a Safe Minimum Standard*, 74 LAND ECON. 287, 287 (1998) (noting that some “advocates of the precautionary principle expand [safe minimum standard] protections into a comprehensive, strong sustainability objective”); J.B. Ruhl, *Sustainable Development: A Five-Dimensional Algorithm for Environmental Law* 18 STAN. ENVTL. L. J. 31 (1999) [hereinafter Ruhl, *Sustainable Development*]. Like the PP, the sustainable development concept has been harshly criticized as indeterminate and potentially counterproductive. See, e.g., WILFRED BECKERMAN, A POVERTY OF REASON: SUSTAINABLE DEVELOPMENT AND ECONOMIC GROWTH (2002). Nevertheless, also like the PP, it has remained prominent and influential, particularly outside of the United States. See James Gustave Speth, *International Environmental Law: Can It Deal With the Big Issues?*, 28 VT. L. REV. 779, 790 (2004).

ticular attack or even of the attacks in combination. Rather, the aim is to unsettle the view that the “first generation debate” in risk regulation has been unequivocally resolved in favor of CBA.⁴² Raising doubts in this manner serves to lend urgency to the more fundamental argument that is offered in Part III—the argument that CBA’s most worrisome aspect is not the results that it generates in particular policy cases, but the threat that it poses over time to our ability even to continue *debating* how we might better manage environmental risk and achieve sustainable development. By its nature, CBA tends to suggest that government policies are “hostage to what the facts turn out to show in particular domains,”⁴³ such that no distinctive notion of collective discretion and responsibility is deemed necessary or appropriate in the fashioning of public policy. So conceived, however, the methodology is unable in the end to account for the normativity of what the facts tell us—that is, for the assumption that some agent somewhere should act in accordance with the facts so discovered.⁴⁴ In the long run, such an approach not only may prove disruptive to the project of reasoning through daunting moral issues, such as international and intergenerational environmental responsibility, that are not typically addressed by the CBA framework, but the approach also may undermine even its *own* attractiveness as a standard of social choice.

In strong terms, critics have attempted to dismiss the PP as “incoherent,”⁴⁵ “indeterminate,”⁴⁶ “paralyzing,”⁴⁷ “worse than unhelpful,”⁴⁸ and “literally senseless.”⁴⁹ Their critiques, however, have overlooked the most desirable feature of the PP, which is not necessarily the level of environmental, health, and safety harm that it promises to avoid, but rather the more subtle manner in which the principle reflects and reinforces a notion of political communities as distinct entities with special responsibility to evaluate their decisions and actions in the context of other societies and other human generations. Despite its seemingly unequivocal command, the Hippocratic principle—“first, do no

42. See *supra* text accompanying note 21.

43. Sunstein & Vermeule, *Capital Punishment*, *supra* note 35, at 30.

44. Cf. SAMUEL SCHEFFLER, BOUNDARIES AND ALLEGIANCES: PROBLEMS OF JUSTICE AND RESPONSIBILITY IN LIBERAL THOUGHT 158 (2001) (observing that utilitarians must offer a “plausible and detailed account of utilitarian social and economic institutions and of the processes by which, in a society regulated by utilitarian principles, motives would develop that were capable of generating ongoing support for those institutions and principles”).

45. Todd J. Zywicki, *Baptists?: The Political Economy of Environmental Interest Groups*, 53 CASE WES. L. REV. 315, 333 (2002).

46. Stone, *supra* note 35, at 10799.

47. Sunstein, *Beyond the Precautionary Principle*, *supra* note 13, at 1004.

48. Cass R. Sunstein, *Your Money or Your Life*, NEW REPUBLIC, March 11, 2004.

49. Sunstein, *Beyond the Precautionary Principle*, *supra* note 13, at 1008.

harm”—is not only or even primarily a behavioral prescription. It is instead a subtle, but steadfast reminder to the professional so cautioned that her actions carry distinctive moral weight and responsibility. It is a reminder most fundamentally to *be moral*. Similarly, the PP’s requirement that we pause to consider the potentially catastrophic or irreversible consequences of our action is at bottom a reminder that social choices express a collective moral identity. *Our* identity. An identity that cannot be located within the freestanding optimization logic of CBA, although we need to consider its content more now than perhaps ever before.

II. THE PROBLEM OF UNCERTAINTY

Every decision to act or refrain from acting implies a range of alternatives that, for better or worse, are not selected. For poets, it is these foregone options that constitute the “saddest” category of human thought and experience: what “might have been.”⁵⁰ Likewise, for critics of the PP, it is primarily these counterfactual costs of behaving according to the principle’s dictates that render the device so objectionable as a basis for public policymaking. The threat of genetically modified “super weeds”⁵¹ looms large, as do the threats of catastrophic climate change⁵² and runaway nanodevices that transform the planet into “gray goo.”⁵³ Less visible, and therefore less attended to according to proponents of the synoptic paradigm, are the vitamin enriched rice strains,⁵⁴ the carbon fueled economic gains,⁵⁵ and the nanoscale cancer cures⁵⁶ that might

50. See John Greenleaf Whittier, *Maud Muller*, in ENGLISH POETRY III: FROM TENNYSON TO WHITMAN (Charles W. Eliot, ed., 1909) (“For of all sad words of tongue or pen, The saddest are these: ‘It might have been!’”).

51. See Douglas A. Kysar, *Preferences for Processes: The Process-Product Distinction and the Regulation of Consumer Choice*, 118 HARV. L. REV. 525, 555 (2004) [hereinafter Kysar, *Preferences for Processes*] (describing biological evidence of genetic trait dispersion among neighboring plants from genetically modified crops).

52. See Douglas A. Kysar, *Climate Change, Cultural Transformation, and Comprehensive Rationality*, 31 B.C. ENVTL. AFF. L. REV. 555, 564-65 (2004) [hereinafter Kysar, *Climate Change*] (describing abrupt climate change scenarios).

53. See Joy, *supra* note 3 (“Among the cognoscenti of nanotechnology, this threat has become known as the ‘gray goo problem.’ Though masses of uncontrolled replicators need not be gray or gooey, the term ‘gray goo’ emphasizes that replicators able to obliterate life might be less inspiring than a single species of crabgrass. They might be superior in an evolutionary sense, but this need not make them valuable.”).

54. See Adler, *supra* note 35, at 200 (describing “the creation of a new strain of rice fortified with additional Vitamin A” that may combat “vitamin A deficiency, which can cause blindness and other ills, [and which] affects up to 250 million children worldwide.”).

55. See BJØRN LOMBERG, *THE SKEPTICAL ENVIRONMENTALIST: MEASURING THE REAL STATE OF THE WORLD* 318 (“Despite our intuition that we naturally need to do something drastic about . . . global warming, economic analyses clearly show that it will be far more expensive to cut CO₂ emissions radically than to pay the costs of adaptation to the increased temperatures.”).

be foregone if society were to abstain from pursuing novel technologies and other uncertain endeavors.

There appears to be no limit to this brand of strong commensurability reasoning. For instance, some commentators contend that the mere act of expending money on regulatory compliance may create adverse health consequences, such that all of regulation truly is a risk-risk proposition.⁵⁷ Similarly, although advocates of the risk-risk paradigm have yet to extend their approach to environmental harms, a plausible basis exists for doing so. Specifically, in light of the Environmental Kuznets Curve (EKC) literature—which purports to find a causal relationship between growth in national GDP per capita and environmental quality—analysts could argue that regulatory expenditures imply a necessary decline in environmental quality, such that regulation not only seems to entail an inherent health-health tradeoff, but an environment-environment one as well.⁵⁸

Given this apparent pervasiveness of foregone benefits in the context of protective regulation—including especially benefits that would *themselves* take the form of improvements to human health or the environment—the logic of instrumentalist balancing and cost-benefit optimization might well seem inescapable. Nevertheless, as this Part describes, the preconditions for reliable balancing and optimization are not always satisfied in the environmental, health, and safety context. Instead, as the simplified classification scheme in Figure 1 shows, knowledge conditions can take diverse forms, ranging from the kind of well-characterized probability and outcome settings presupposed by CBA to the more stark conditions of uncertainty and ignorance that attract the at-

56. See Glenn Harlan Reynolds, *Nanotechnology and Regulatory Policy: Three Futures*, 17 HARV. J. L. & TECH. 179, 186 (2003) (speculating that “specially designed nanodevices, the size of bacteria, might be programmed to destroy arterial plaque, or fight cancer cells, or repair cellular damage caused by aging.”).

57. See, e.g., Frank B. Cross, *When Environmental Regulations Kill: The Role of Health/Health Analysis*, 22 ECOLOGY L.Q. 729, 755 (1995); Ralph L. Keeney, *Mortality Risks Induced by the Costs of Regulations*, 8 J. RISK & UNCERT. 95 (1994); Randall Lutter & John F. Morrall III, *Health-Health Analysis: A New Way to Evaluate Health and Safety Regulation*, 8 J. RISK & UNCERTAINTY 1 (1993); Randall Lutter, John Morrall, & W. Kip Viscusi, *The Cost-Per-Life-Saved Cutoff for Safety-Enhancing Regulations*, 37 ECON. INQ. 599 (1999); W. Kip Viscusi, *Regulating the Regulators*, 63 U. CHI. L. REV. 1423, 1452-1453 (1996); Cass R. Sunstein, *Health-Health Tradeoffs*, 63 U. CHI. L. REV. 1533 (1996); W. Kip Viscusi & Richard J. Zeckhauser, *The Fatality and Injury Costs of Expenditures*, 8 J. RISK & UNCERT. 19 (1994).

58. See Douglas A. Kysar, *Some Realism About Environmental Skepticism: The Implications of Bjørn Lomborg’s The Skeptical Environmentalist for Environmental Law and Policy*, 30 ECOLOGY L.Q. 223, 249-252 (2003) (describing and criticizing the Environmental Kuznets Curve literature).

tention of PP proponents.⁵⁹ Thus, a critical challenge for risk regulators is to ensure that their decisionmaking models are appropriately suited to the nature and degree of knowledge actually held, whether the models concern the assessment of ecological or human health hazards, the anticipation of social and economic consequences, or some more ambitious integration of all such empirical considerations.

Figure 1

	OUTCOMES WELL DEFINED	OUTCOMES POORLY DEFINED
Probabilities Well Defined	Risk	Ambiguity
Probabilities Poorly Defined	Uncertainty	Ignorance

As this Part argues, the PP can be defended as a pragmatic decisionmaking heuristic that is particularly well-suited to the task of fostering consideration of how best to safeguard life and the environment under conditions of uncertainty and ignorance. Contrary to prominent critiques, the PP does not urge regulators “to be universally precautionary.”⁶⁰ Instead, the PP focuses on particular categories of harm and separates them out for special treatment during early stages in the development of human knowledge and experience. Viewed sympathetically, this asymmetry of concern represents a procedurally rational mechanism for catalyzing empirical investigation, redressing political imbalances, and responding with prudence to threats of a potentially catastrophic or irreversible nature. Indeed, in many real world contexts, heuristic decisionmaking of the sort embodied in the PP expresses a kind of “ecological rationality”⁶¹—that is, a pragmatic decisionmaking approach that is both well-tailored to the informational and cognitive constraints of actual choice environments and capable of evolving and adapting over time.

59. Adapted from Andy Stirling, *The Precautionary Principle in Science and Technology*, in REINTERPRETING THE PRECAUTIONARY PRINCIPLE, *supra* note 41, at 61, 79. The fourth possibility—ambiguity—seems only to attract the attention of game show hosts.

60. Sunstein, *Beyond the Precautionary Principle*, *supra* note 13, at 1008.

61. See Douglas A. Kysar et al., *Group Report: Are Heuristics a Problem or a Solution?*, in HEURISTICS AND THE LAW 103, 112 (Gerd Gigerenzer & Christoph Engel eds., 2005).

A. Complexity

Much of the divide in risk regulation can be understood as a difference of view over which of the boxes in Figure 1 most accurately describes our policymaking predicament.⁶² As J.B. Ruhl has observed, “[t]he prevailing schools of environmental policy have described our problem as a series of linear, one-dimensional decisionmaking systems,” an approach that assumes “economic conditions can be translated predictably into economic conclusions that call for prescribed economic measures, [and] environmental conditions can be translated predictably into environmental conclusions that call for environmental measures.”⁶³ If indeed these prevailing schools are correct that biophysical and sociolegal systems are well-behaved—such that they follow linear operating rules, map onto normal or Gaussian probability distributions, and exhibit stable equilibrium outcomes—then data gaps and other shortcomings of human knowledge need not be viewed as deeply problematic.

If, on the other hand, these systems are complex—such that they exhibit “behaviors such as feedback, emergence, path dependence, and nonlinearity”⁶⁴—then risk regulators face a fundamentally different task. Not only must they assess and manage risks of an uncertain magnitude, but they must do so within the context of numerous, overlapping dynamic systems, each of which is charac-

62. Compare David E. Adelman, *The False Promise of the Genomics Revolution for Environmental Law*, 29 HARV. ENVTL. L. REV. 117 (2005) (arguing that hope for revolutionary advances in environmental standard-setting from the emerging field of toxicogenomics is misplaced); Cary Coglianese & Gary E. Marchant, *Shifting Sands: The Limits of Science in Setting Risk Standards*, 152 U. PA. L. REV. 1255, 1258 (2004); and Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, with Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115, 124 (2003) (arguing that, although “pervasive uncertainties are simply assumed by most scholars to be part of the framework within which environmental law must operate,” developments in information technology and other scientific fields promise to significantly reduce environmental uncertainty and increase the likelihood of regulatory efficacy).

63. Ruhl, *Sustainable Development*, *supra* note 41, at 46; See also Brian Wynne, *Uncertainty and Environmental Learning: Reconceiving Science and Policy in the Preventive Paradigm*, 2 GLOBAL ENVTL. CHANGE 111, 113 (1992) (observing that risk assessment was “originally developed for relatively very well structured mechanical problems” and that environmental systems, in contrast, “cannot be designed, manipulated and reduced to within the boundaries of existing analytical knowledge”).

64. J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 GEO. L. J. 757, 763 (2003). See also J.B. Ruhl & Harold J. Ruhl, Jr., *The Arrow of the Law in Modern Administrative States: Using Complexity Theory to Reveal the Diminishing Returns and Increasing Risks the Burgeoning of Law Poses to Society*, 30 U.C. DAVIS L. REV. 405 (1997); J.B. Ruhl, *Complexity Theory as a Paradigm for the Dynamical Law-and-Society System: A Wake-Up Call for Legal Reductionism and the Modern Administrative State*, 45 DUKE L. J. 849 (1996); Ruhl, *Sustainable Development*, *supra* note 41, at 46; J.B. Ruhl, *Thinking of Environmental Law as a Complex Adaptive System: How to Clean up the Environment by Making a Mess of Environmental Law*, 34 HOUS. L. REV. 933 (1997).

terized by such perplexing features as extreme sensitivity to minor variations in condition,⁶⁵ “fat tail[]” probability distributions,⁶⁶ and irreducible levels of uncertainty, or chaos.⁶⁷ This is a far more intractable problem setting than has tended to be recognized in the risk regulation debate, even by those who critique CBA for its Herculean informational demands. Because complex adaptive systems contain ineliminable uncertainties that cannot be presumed to be insignificant, such systems by their nature are likely to present *ill-posed problems*—that is, problems whose imperviousness to resolution is not driven by deficiencies in our epistemic position, but rather by features inherent to the problems themselves.

CBA in particular may falter if risk regulation is characterized by complexity and uncertainty, given that adherence to the synoptic paradigm demands techniques and strategies for rendering policy spaces quantitatively tractable.⁶⁸ In the view of some observers, the procedures adopted by proponents of the synoptic paradigm in response to this difficulty often are analytically and democratically unsatisfying.⁶⁹ To be sure, defenders of CBA frequently respond to this charge by arguing that alternative approaches also are susceptible to mistake and manipulation, and

65. See Ruhl & Salzman, *supra* note 64, at 817-19.

66. See Daniel A. Farber, *Probabilities Behaving Badly: Complexity Theory and Environmental Uncertainty*, 37 U.C. DAVIS L. REV. 145, 152-55 (2003).

67. See *id.* at 153. This is not to suggest that the systems are indeterminate, but rather that their rules of operation give rise to stunningly complex and difficult-to-predict interactions. Extremely minor, even immeasurable variations in conditions between two otherwise identically situated systems—such as the presence in one system of the proverbial flapping of a butterfly’s wings—can give rise to dramatic differences in outcome between the two systems only a few evolutionary steps later. The resulting “chaos” is not randomness per se, but rather “order masquerading as randomness,” a state of being that, although deterministic, nevertheless remains irreducibly uncertain. JAMES GLEICK, *CHAOS: MAKING A NEW SCIENCE* 22 (1987).

68. See OECD, *THE ECONOMIC APPRAISAL OF ENVIRONMENTAL PROJECTS AND POLICIES: A PRACTICAL GUIDE* 150 (1995) (“The treatment of uncertainty and risk looms large in environmental appraisal. Converting uncertainty into risk is essential to make the problem tractable.”); Richard T. Woodward & Richard C. Bishop, *How to Decide When Experts Disagree: Uncertainty-Based Choice Rules in Environmental Policy*, 73 LAND ECON. 492, 505 (1997) (“If one considers a spectrum of choice problems from pure uncertainty to pure risk, almost all of the attention of economists has been on one extreme . . . This has led to policy advice and analysis that either implicitly or explicitly requires policymakers to divine probability distributions.”).

69. As Amartya Sen and Bernard Williams put it, “Government House utilitarianism” such as that embodied in CBA risks becoming “an outlook favouring social arrangements under which a utilitarian elite controls a society in which the majority may not itself share those beliefs.” Amartya Sen & Bernard Williams, *Introduction: Utilitarianism and Beyond*, in *UTILITARIANISM AND BEYOND* 1, 16 (Amartya Sen & Bernard Williams eds., 1982). Sen and Williams refer particularly to the partial disclosure conception of utilitarianism, in which elites apply the utilitarian calculus to social decisionmaking without disclosing their method of analysis, given the fear that its cold calculation might undermine the basis of social cohesion among citizens less capable of such enlightened reason. Compare Richard A. Posner, *Our Incompetent Government*, NEW REPUBLIC, Nov. 14, 2005, 23, 26 (decrying “the incapacity of our political class . . . to think in cost-benefit terms”).

that the virtue of CBA is its requirement that regulators exhaustively identify and analyze the expected consequences of policy proposals. This argument, however, only explains why regulators should be required to provide a comprehensive survey of potential policy effects, *not* why such effects should be aligned along a single numerical metric. It is the latter requirement that often forces the CBA analyst to adopt methods of quantification and monetization that attract criticism.

A particularly clear demonstration of the critics' concern can be seen in certain quasi-scientific attempts by the FDA to control the scope of the risk assessment process by adopting a presumption that novel technological processes themselves are unworthy of heightened scrutiny. As noted above,⁷⁰ such an assumption underlies the agency's determination that nanomaterials in consumer products such as sunscreens do not require an additional risk assessment if their macroscale counterparts have been previously evaluated. The assumption also may be located in the "substantial equivalence doctrine" that the FDA has used in the genetically modified agriculture context, and the "compositional analysis method" that it has proposed for use in the case of cloned livestock for human consumption.⁷¹ In all three cases, the FDA has made its risk assessment burden lighter by assuming that novel scientific processes (e.g., nanoscaling, genetic modification, cloning) are not in themselves cause for regulatory scrutiny or distinction, but rather only become relevant if they lead to manifest differences in the physical or compositional characteristics of end products as compared to conventional counterparts.

The flaws with such an assumption are many.⁷² For present purposes, the most significant shortcoming is the assumption's implicit view that "what we don't know won't hurt us." On the FDA's approach, situations of deep uncertainty regarding the potential impacts of novel technological processes are treated as unworthy of regulatory attention, an approach that reflects what Wendy Wagner has called the "unprecautionary principle."⁷³ Of course, the resulting permissive approach comports with the general tendency of liberal market democracies not to impede private action unless and until a public justification has been demonstrated. The confusion, however, is that this political predisposition has been presented in a scientific vernacular, as an assumption about the empirical ten-

70. See *supra* text accompanying note 10.

71. See Kysar, *Preferences for Processes*, *supra* note 51.

72. See *id.*

73. Wendy E. Wagner, *The Precautionary Principle and Chemical Regulation in the U.S.*, 6 HUMAN & ECOLOGICAL RISK ASSESSMENT 459, 466-68 (2000).

dencies of nascent technologies. In the nanotechnology context, this approach seems especially inapt, given that scientists believe nanoscale materials are potentially revolutionary precisely because they display marked differences in chemical and physical behavior as compared to their macroscale equivalents. Assigning the burden of proof on such issues is therefore an inherently political exercise, one that should be seen as affecting the distribution of power and knowledge in society, rather than simply being derived from it.

Proponents of CBA have adopted more nuanced ways of dealing with incomplete information. Analysts sometimes contend, for instance, that the proper utilitarian response to situations of uncertainty is not to abandon the quest for optimization, as the PP appears to require, but instead to estimate and incorporate the costs and benefits of uncertainty directly into the optimization model. Although preferable to the FDA's blunt refusal to acknowledge uncertainty, this procedure still suffers from a basic limitation: Without knowing the expected value of future knowledge (which depends on the same unknown probabilities and outcomes that render the situation imperfectly characterized for purposes of risk assessment and CBA), the analyst cannot identify the point at which broadened regulatory inspection itself is no longer cost-justified. Unwilling to concede uncertainty and ignorance, the analyst instead teeters on the edge of an infinite regress.⁷⁴ In the context of complex adaptive systems, this problem is especially acute because the analyst cannot rely on a constant trend of diminishing returns from knowledge acquisition, given the possibility that minor perturbations in one period may give rise to dramatic effects many periods hence.

Introducing genetically modified organisms or nanomaterials widely into field environments raises similar concerns, given the practically irreversible nature of such action. For such decisions, proponents of CBA typically argue that the expectation calculus should be expanded to include whatever "option value" would be lost by engaging in an irreversible action with uncertain effects.⁷⁵ For instance, one of the earliest and most significant papers in the environmental economics literature began by observing, "[I]f we are uncertain about the payoff to investment in development,

74. See Jonathan Baert Wiener, *Managing the Iatrogenic Risks of Risk Management*, 9 RISK 39, 73-74 (1998) (referring to the "optimal stopping problem" raised by such dilemmas).

75. See Kenneth J. Arrow & Anthony C. Fisher, *Environmental Preservation, Uncertainty, and Irreversibility*, 88 Q. J. ECON. 312 (1974); C. Henry, *Investment Decisions Under Uncertainty: The Irreversibility Effect*, 64 AM. ECON. REV. 1066 (1974). For a leading efficiency model incorporating option values, see A. Myrick Freeman, *The Sign and Size of Option Value*, 60 LAND ECON. 1 (1984).

we should err on the side of underinvestment, rather than overinvestment, since development is irreversible.”⁷⁶ Proponents of the PP would, of course, wholeheartedly agree. They would not agree, however, that the option value of this precaution should simply be priced and incorporated into the efficiency calculus so that CBA can continue in “the usual way.”⁷⁷ To PP adherents, such an exercise invites exclusionary, technocratic decisionmaking in the face of grave, uncertain collective choices—precisely the type of context that they believe instead requires inclusiveness, transparency, and candid acknowledgment that unavoidably moral choices are being undertaken.⁷⁸

Most obviously susceptible to this critique is Delphi analysis, which is one prominent analytical method used by CBA practitioners to get the consequentialist-utilitarian ball rolling, despite the presence of true uncertainty. The Delphi technique consists essentially of gathering subjective assessments of unknown risks from a survey of experts in relevant fields. By then searching for a point of convergence among the expert responses, analysts hope to assign a Bayesian prior subjective belief that, in turn, will afford some nonarbitrary basis for taking a “first stab” at calculating expected outcomes.⁷⁹ Proponents of CBA sometimes even deny that there is such a thing as uncertainty, apparently taking the view that if Bayesian rather than frequentist probability theory is adopted, *some* number always will be available to the cost-benefit optimizer.⁸⁰ The question immediately raised, however, is: *Whose* subjective probability assessments will form the basis of the Bayesian exercise? Without devoting careful attention to concerns of inclusiveness and participatory legitimacy, environmental policymakers risk obscuring essentially normative judgments through

76. See Arrow & Fisher, *supra* note 75, at 317.

77. *Id.* at 319.

78. See Wynne, *supra* note 63, at 115 (arguing that “institutionalized exaggeration of the scope and power of scientific knowledge creates a vacuum in which should exist a vital social discourse about the conditions and boundaries of scientific knowledge in relation to moral and social knowledge.”).

79. For discussion of Bayesian probability theory, see David E. Adelman, *Scientific Activism and Restraint: The Interplay of Statistics, Judgment, and Procedure in Environmental Law*, 79 NOTRE DAME L. REV. 497 (2004); Matthew D. Adler, *Against “Individual Risk”: A Sympathetic Critique of Risk Regulation*, 153 U. PA. L. REV. 1121 (2005); Stephen Charest, *Bayesian Approaches to the Precautionary Principle*, 12 DUKE ENVTL. L. & POLY F. 265 (2002). As Charest points out, the Bayesian approach may be an improvement over risk assessment techniques that incorporate subjective assumptions through less transparent means.

80. See Dexter Samida & David A. Weisbach, *Paretian Intergenerational Discounting*, 74 U. CHI. L. REV. __ (forthcoming 2007) (stating that the authors “are not sure that Knightian uncertainty is a meaningful category”).

an exercise that, when properly understood, often merits only a weak case for deference.⁸¹

Other approaches used by CBA practitioners when faced with true uncertainty include Monte Carlo analysis and similar statistical methods for generating hypothetical distributions of unknown probabilities. These computer techniques evaluate the effects of policy proposals under thousands of different states of the world such that, even in the face of uncertainty, analysts may be able to locate policy prescriptions that predominate over a wide range of possible conditions.⁸² Such techniques depend, however, on the specification of certain assumptions about the theoretical nature of unknown probabilities and, in keeping with the classical scientific tradition, analysts typically specify normal or Gaussian probability behavior.⁸³ When applied to systems that behave, instead, according to the laws of complexity, such assumptions can lead to dramatically erroneous policy advice, despite the great technological sophistication of the Monte Carlo procedure.⁸⁴

81. Scholars from the AEI-Brookings Joint Center for Regulatory Studies, for instance, have proposed the use of Delphi techniques to fill data gaps in regulatory analysis, yet their own use of the methodology to argue against the desirability of environmental, health, and safety regulation raises cause for skepticism. See Robert W. Hahn & Rohit Malik, *Is Regulation Good for You?*, 27 HARV. J. L. & PUB. POLY 893, 898 n.21 (2005). In what amounts to an ad hoc opinion poll, "leading regulatory economists" were asked to estimate the percentage of major environmental, health, and safety regulations implemented between 1993 and 2002 that would have passed a cost-benefit test if the economists themselves were performing the analysis. See *id.* at 902. Researchers from the Center implicitly concede the deeply subjective nature of this exercise when they note that survey respondents were chosen to be "fairly evenly distributed in terms of their political affiliation"—a control measure that should not have been necessary if CBA really offered the objective policy advice that its more zealous adherents proclaim. *Id.* In the end, it is unclear what the researchers intended to contribute with the survey, except perhaps confirmation that many economists distrust federal agencies and the democratic process. Cf. *id.* at 907 (describing "one of [the authors'] wilder dreams" in which CBA is used to "mak[e] each agency really sing for its supper").

82. See WILLIAM D. NORDHAUS, *MANAGING THE GLOBAL COMMONS: THE ECONOMICS OF CLIMATE CHANGE* 184 (1994). For a discussion of how Monte Carlo procedures are used in toxic risk assessment, see Susan R. Poulter, *Monte Carlo Procedures in Environmental Risk Assessment—Science, Policy and Legal Issues*, 9 RISK 7 (1998).

83. See JUDSON JAFFE & ROBERT N. STAVINS, AEI-BROOKINGS JOINT CENTER FOR REGULATORY STUDIES, *THE VALUE OF FORMAL QUANTITATIVE ASSESSMENT OF UNCERTAINTY IN REGULATORY ANALYSIS* (2004), <http://www.aei.brookings.org/admin/authorpdfs/page.php?id=1045>.

84. A salient example from finance theory helps to elucidate this point. Reflecting their classical assumptions, conventional models of financial markets tend to deny the likelihood that major market crashes will occur with the magnitude that we have, nonetheless, experienced on multiple occasions in the previous century. See BENOIT MANDELBROT & RICHARD L. HUDSON, *THE (MIS)BEHAVIOR OF MARKETS* 4-5 (2004). This denial could be explained in one of two ways. On the one hand, we could be experiencing inconceivably bad luck during this period in our history such that later, when averaged over subsequent crash-free millennia, the infinitesimal risk predicted by Gaussian financial models will turn out to be vindicated. On the other hand, it could be that our models are wrong and that, as Daniel Farber puts it, "it is reasonably foreseeable that non-reasonably foreseeable events will occur from time to time." Farber, *supra* note 66, at 146.

B. Catastrophe

Criticisms of CBA's efforts to grapple with complexity and uncertainty have particular purchase in the case of potentially catastrophic risks. As Judge Richard Posner's recent book notes, humanity faces a number of threats of uncertain, but possibly monumental consequence, including some threats that might entail the erasure of all life on the planet.⁸⁵ In the face of such complete catastrophic threats, conventional approaches to CBA would, first, sum up the total monetary-equivalent worth of the expected human population at the time of potential destruction and, second, discount that number, both for time and for likelihood.⁸⁶ The resulting number would, of course, be finite. It might also be quite small, particularly if the anticipated disaster looms far in the future or with minute probability. One could increase the number to reflect a degree of risk aversion, but the result still would be finite and, if cost-benefit analyses of climate change are an indication,⁸⁷ not alarmingly large.

The question then arises whether the expectation calculus of CBA is appropriately textured for the type of decision actually being confronted. We have ruled out infinite values by assumption⁸⁸ and our methodology devotes only indirect attention to vari-

85. See POSNER, *CATASTROPHE*, *supra* note 18, at 21 ("The number of extreme catastrophes that have a more than negligible probability of occurring in this century is alarmingly great, and their variety startling.").

86. Initially, one might expect that CBA would value an outcome of complete destruction at precisely zero, given that CBA tends to measure all welfare consequences from the perspective of individual preferences and, by assumption, no individuals would remain to express such preferences following an apocalyptic event. *Cf. infra* text accompanying notes 152-153 (observing that some CBA proponents argue present generations have no moral obligations at all with regard to future generations). As Matthew Adler has argued, however, death can be thought of as a welfare setback, even for the person who expires. See Adler, *supra* note 79, at 1200. The thought project forces the analyst to determine whether utility is better assessed *ex ante* or *ex post*. In this case, given the hypothesized annihilation of all potential evaluators, only *ex ante* figures could be used. As Adler notes, economists in general tend to use *ex ante* preference assessments. See *id.* Psychologists, on the other hand, find large and systematic deviations between the two assessment frames, raising in the process important questions about the nature of utility and well-being. See generally DANIEL KAHNEMAN ET AL., *WELL-BEING: THE FOUNDATIONS OF HEDONIC PSYCHOLOGY* (1999).

87. See Kysar, *Climate Change*, *supra* note 52, at 570.

88. The tenets of rational choice theory break down when applied to gambles involving infinite value stakes. Most notably, the standard rationality assumption of continuity, which ensures that individuals can make tradeoffs between all relevant outcomes, is violated by the introduction of infinite utility outcomes. Scholars tend to respond to this complication either by developing entirely new formulations of decision theory that are capable of grappling with infinite utilities, or simply by ruling such utilities inadmissible in order to maintain the theoretical consistency of their framework. The former approach requires abandoning much of the conventional statistical approach to decisionmaking, including the laws of large numbers and, correspondingly, confidence that the concepts of expectation and risk aversion together provide a satisfactory guide for decisionmaking. The latter approach

ance, through the risk aversion adjustment. As a result, we have come to contemplate the “end of life as we know it” with a soberness that might appear, to many, irrational. Unlike repeat-play monetary gambles, for which probabilistically-determined outcomes provide an invaluable source of information, expectation seems to provide a poor decision guide for irreversible or catastrophic events. Put bluntly, either nanotechnology will transform the planet into “gray goo” or it will not. We do not know what the precise probabilities involved are, but given the nature of discontinuity, we do know that the expected utility outcome—the weighted average of these extremes—will *not* occur.⁸⁹ Thus, by displacing context-sensitive discussion of precisely what outcomes are being gambled in favor of what gains and for which winners and losers, the CBA approach tends to understate the challenge posed by long-term catastrophic risks.

In light of such concerns, one might be tempted to carve out irreversible or catastrophic risks for special treatment, leaving CBA to serve as the predominant method for evaluating more routine environmental, health, and safety decisionmaking.⁹⁰ The teachings of complexity theory, however, suggest that much of our understanding of “routine” risk regulation is misguided. The problem of irreversibility, for instance, should not be seen as restricted to one-shot disaster scenarios. Rather, given the presence of sensitivity, feedback loops, and other features of path dependence, some degree of irreversibility should be expected to characterize all decision nodes within complex adaptive systems.⁹¹ Indeed, if the teachings of complexity theory are

is obviously more theoretically tidy, but seems unacceptable so long as the idea of infinite values appears both meaningful and practically relevant to some actual decisions.

89. As Posner notes, “*by definition*, all but the last doomsday prediction is false.” POSNER, *CATASTROPHE*, *supra* note 18, at 13. The standard view of CBA defenders instead seems to be that, “[w]e live in a continuous world.” Robert H. Frank, *Why is Cost-Benefit Analysis So Controversial?*, 29 J. LEGAL STUD. 77, 78 (2000).

90. See Cass R. Sunstein, *Cost-Benefit Analysis and the Environment*, *supra* note 35; Cass R. Sunstein, *Irreversible and Catastrophic* (Univ. Chicago John M. Olin Law & Econ. Working Paper No. 242, 2d Series 2005) available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=705323.

91. Sunstein argues further that irreversibilities should be seen to lie “on all sides” of the risk regulation equation, given that precautionary regulations may create their own irreversible effects, such as “increased dependence on nuclear energy” in the case of greenhouse gas mitigation policies. Sunstein, *Irreversible and Catastrophic*, *supra* note 90, at 20. This argument appears to embrace the teachings of complexity theory, in the sense that systems such as the atmosphere or the regulated market are seen as likely to exhibit path dependency, feedback effects, and other tendencies toward irreversibility. Sunstein does not, however, engage the broader challenge posed by complexity theory to synoptic decisionmaking approaches such as CBA. Like the radical commensurability implications of the “risk-risk,” “health-health,” and “environment-environment” arguments, see *supra* text accompanying notes 57-58, Sunstein’s “irreversibility-irreversibility” argument challenges far more than simply the conceptual underpinnings of the PP. It also problematizes the very basis on which moral decisionmaking gains traction, since it serves to erode the conceptions of dis-

sound, then environmental, health, and safety dilemmas will, almost by definition, present ill-posed problems that contain “nasty surprises”⁹² and other computationally intractable features. As the next Section explains, such features of complex, adaptive systems raise the possibility that pragmatic decisionmaking procedures such as the PP may prove more “ecologically rational” than formal analytical devices such as CBA.

C. Procedural Rationality

In the context of complex, adaptive systems, the deliberate attempt to optimize may not represent simply an imperfect, but useful aid to decisionmaking, as CBA defenders often assert.⁹³ Rather, it may represent a solution concept that is poorly matched for the problem tasks at hand. In the face of ill-posed problems, we cannot confidently expect that the errors of CBA will cluster around an “optimal” result—indeed, for such problems the very notion of an optimum eludes meaningful description. The errors of CBA therefore are capable of deviating substantially and unpredictably from decision paths that are easily identified as desirable—if not necessarily optimal—through less formalistic decision procedures. In light of such concerns, proponents of the PP consciously part ways with the technocratic paradigm underlying risk assessment and CBA. Rather than insist on quantification as a predicate to decisionmaking,⁹⁴ they instead argue that environ-

tinctive human agency that underwrite a great deal of our moral reasoning and may even provide the fulcrum on which it ultimately depends. *See infra* text accompanying notes 211-225.

92. Farber, *supra* note 66, at 167.

93. *See, e.g.*, CASS R. SUNSTEIN, *THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION* 25-26 (2002) (“The strongest arguments for CBA seem to rest not with neoclassical economics but with common sense, informed by behavioral economics and cognitive psychology.”); SUNSTEIN, *LAWS OF FEAR*, *supra* note 19, at 149 (defending CBA for its ability to “produce useful information” and “increase the coherence of programs that would otherwise be a product of some combination of fear, neglect and interest-group power”); SUNSTEIN, *RISK AND REASON*, *supra* note 19, at ix (“[C]ost-benefit analysis should be seen as a simple pragmatic tool, designed to promote a better appreciation of the consequences of regulation.”).

94. Hahn and Malik are particularly insistent on this point. After noting that many federal regulations offer benefits that have been left unquantified by adopting agencies, the authors first skeptically observe that “[t]he question naturally arises as to whether there are really benefits to those regulations.” Hahn & Malik, *supra* note 81, at 895. Then, as part of their effort to assess the costs and benefits of major regulations, the authors simply assign “zero benefits” to those regulations for which benefits were left unquantified by the relevant agency. *See id.* at 898. To defend this procedure, Hahn and Malik state that “any other assumption seems totally arbitrary.” *Id.* But assigning zero is no more or less arbitrary than assigning any other number would be in this situation. Instead, what is truly arbitrary is insisting on a quantified value under circumstances in which quantification cannot reliably proceed. *See* Woodward & Bishop, *supra* note 68, at 506 (arguing that “if the

mental, health, and safety regulation should become infused with a “culture of humility about the sufficiency and accuracy of existing knowledge.”⁹⁵

As it turns out, the United States has enjoyed a long and successful experience with precisely this approach. Despite the current prominence of CBA among U.S. policymakers and academics, much of U.S. environmental law and regulation continues to be based instead on policies and procedures that reflect a precautionary approach. In several key pollution control areas, for instance, the United States has forsaken optimization in favor of a precautionary practice of requiring installation of the best available pollution abatement technology,⁹⁶ often with opt-out procedures extended to firms that are able to demonstrate achievement of equal abatement levels using alternative technologies.⁹⁷ This simple heuristic—in essence, “do the best you can”⁹⁸—implies great collective commitment to the preservation of human life and the environment without requiring satisfaction of Herculean informational demands by regulators.⁹⁹

decision maker does not possess well-defined probabilities, then the use of ad hoc probabilities is not rational”).

95. Stirling, *supra* note 59, at 66. See also Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562 (1992).

96. As Richard Stewart has noted, one frequently offered interpretation of the PP is that the best available pollution control technology should be required of all proponents of activities with uncertain environmental, health, or safety threats. See Richard B. Stewart, *Environmental Regulatory Decisionmaking Under Uncertainty*, in 20 RES. IN L. AND ECON. 71, 78 (Timothy Swanson ed., 2002).

97. See Daniel Bodansky, *The Precautionary Principle in US Environmental Law, in INTERPRETING THE PRECAUTIONARY PRINCIPLE* (Timothy O’Riordan & James Cameron eds., 1994). See also Adam Babich, *Too Much Science in Environmental Law*, 28 COLUM. J. ENVTL. L. 119, 125 (2003) (“The requirement of best available technology embodies a policy judgment as attractive as apple pie.”); Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and “Fine-Tuning” Regulatory Reforms*, 37 STAN. L. REV. 1267, 1283-84 (1985) (noting Congress repeatedly “chose to emphasize the need for prompt injury prevention over the need for an optimal balance between regulatory benefits and costs” in its landmark 1970s legislation); Thomas O. McGarity, *The Goals of Environmental Legislation*, 31 B.C. ENVTL. AFF. L. REV. 529, 538-545 (2004) (reviewing examples); Wendy E. Wagner, *The Triumph of Technology-Based Standards*, 2000 U. ILL. L. REV. 83 (attributing much of the success of pollution reduction in the modern environmental era to technology-based standards). Significant early environmental court decisions also emphasized the precautionary basis of U.S. risk regulation. See *Reserve Mining Co. v. E.P.A.*, 514 F.2d 492 (8th Cir. 1975); *Ethyl Corp. v. E.P.A.*, 541 F.2d 1, 28 (D.C. Cir. 1976).

98. See Wagner, *supra* note 97, at 92.

99. Moreover, in practice, the approach tends to produce results similar to those of a “knee of the cost curve” decisionmaking heuristic, in which pollution abatement is required at least to the point at which marginal returns from further abatement begin to steeply decline. See Thomas O. McGarity, *The Internal Structure of EPA Rulemaking*, 54 LAW & CONT. PROB. 57, 62 (1991). In this manner, the “best available control technology” requirement demonstrates some cost-sensitivity (or proportionality) without depending on unrealistic and controversial assumptions regarding the ability of regulators to equalize the marginal costs and benefits of abatement. The policy standard instead assumes that the hazards of pollution are sufficiently severe and unpredictable that only the “best” effort at pre-

Realistic but unquantifiable threats of catastrophic loss present an additional case in which heuristic decisionmaking procedures may prove more pragmatically sensible than deliberate cost-benefit optimization. With regard to climate change, for instance, future generations may reflect with marvel on our present day attempts to meticulously calculate the costs and benefits of greenhouse policies. Such studies typically lead to a conclusion that the economic benefits of continued fossil fuel consumption more than outweigh the physical, agricultural, and ecological costs that would be averted by restricting emissions, at least for the next few decades. Accordingly, the optimal carbon reduction policy under CBA is a rather limited one that should not begin any time soon.¹⁰⁰ The important lesson from complexity theory, again, is that the apparent CBA consensus on climate change may not merely be wrong; it may be wildly wrong. Especially in light of the relatively minor cost associated with implementing most proposed carbon emissions abatement policies, uncertain but potentially catastrophic consequences of anthropogenic greenhouse gas emissions should not simply be reduced to an expectation value and included within cost-benefit calculation.¹⁰¹

Along these lines, a growing number of scientists and policymakers have begun to focus attention on the stabilization of greenhouse gas concentrations at a level that is hoped to be sufficiently low to eliminate the possibility of truly disastrous climate change scenarios.¹⁰² By advocating the limitation of human emissions to a point that will avoid exceeding this critical level *whatever the cost*, proponents eschew optimization and instead adopt something more closely resembling the “safe minimum standards” approach that is familiar from the economic literature on endangered species regulation.¹⁰³ Recognizing that climate change, like

vention will suffice. Such an aspirational standard should not be seen as reflecting a naïve belief in the possibility of a “zero risk” society. See W. Kip Viscusi, *Equivalent Frames of Reference for Judging Risk Regulation Policies*, 3 N.Y.U. ENVTL. L. J. 431, 465 (1995). Instead it reflects a sensitive appreciation both of the practical difficulties of crafting, defending, and enforcing pollution control standards, and of the deeply moral connotations that our legal pronouncements entail. See *infra* text accompanying notes 169-170 (discussing the “moral remainder” that accompanies the tragic choices entailed by risk regulation and that cannot be subsumed by the cost-benefit procedure).

100. See LOMBORG, *supra* note 55, at 318 (noting that “economic analyses clearly show that it will be far more expensive to cut CO₂ emissions radically than to pay the costs of adaptation to the increased temperatures.”).

101. See Kysar, *Climate Change*, *supra* note 52, at 563-64.

102. See *id.* at 565-66.

103. Richard C. Bishop, *Endangered Species And Uncertainty: The Economics Of A Safe Minimum Standard*, AM. J. AGRIC. ECON. 10 (Feb., 1978); S.V. CIRIACY-WANTRUP, *RESOURCE CONSERVATION: ECONOMICS AND POLICIES* (1st ed., 1952). See also Barton H. Thompson, Jr., *People or Prairie Chickens: The Uncertain Case for Optimal Biodiversity*, 51 STAN. L. REV. 1127, 1159-63 (1999) (reviewing and critiquing the “safe minimum standards” literature).

species preservation, is characterized by uncertainty, irreversibilities, critical thresholds, and other hallmark features of complexity, proponents argue that society should establish “safe minimum standards . . . for protecting Earth’s life-support systems in the face of virtually inevitable unpleasant surprises.”¹⁰⁴

This “safe minimum standards” approach has long been associated with the PP.¹⁰⁵ One also may think of the “safe minimum standards” approach as resembling the maximin principle from decision theory, which counsels minimization of the maximum possible loss when decisionmakers are faced with policy choices that are characterized by true uncertainty.¹⁰⁶ Most famously discussed by John Rawls in the context of elaborating an egalitarian theory of justice,¹⁰⁷ the maximin principle reflects what would be termed an extreme degree of risk aversion if probabilistic information on outcomes were actually available, given that the principle focuses attention exclusively on the worst case outcome from each possible course of action under inspection. For this reason, the principle has attracted a substantial share of criticism.¹⁰⁸ Nevertheless, at least as a preliminary stance, proponents of the PP believe that an extreme level of risk aversion is appropriate for policymaking that concerns unknown but potentially devastating threats to the global climate, the ozone layer, biodiversity, and other natural systems that are thought to be of fundamental and irreplaceable importance to humanity.

Whether characterized as the PP, the best available technology requirement, the safe minimum standard, or the maximin principle, each of these related decisionmaking techniques reflects an awareness that truly rational risk regulation sometimes re-

104. Paul R. Ehrlich, *Ecological Economics and the Carrying Capacity of the Earth*, in NATURAL CAPITAL: THE ECOLOGICAL APPROACH TO SUSTAINABILITY 38, 49 (A. Jansson et al, eds., 1994).

105. See T.M. Crowards, *Combining Economics, Ecology and Philosophy: Safe Minimum Standards of Environmental Protection*, in VALUATION AND ENVIRONMENT: PRINCIPLES AND PRACTICES (M. O’Connor & C. Spash eds., 1997); O’Riordan et al, *The Evolution of the Precautionary Principle*, *supra* note 41, at 23.

106. Indeed, as Sunstein notes, the maximin principle shares much conceptual space with the PP, given that both principles direct “officials to identify the worst case among the various options, and to select that option whose worst case is least bad.” Sunstein, *Beyond the Precautionary Principle*, *supra* note 13, at 1033.

107. But see Derek Parfit & John Broome, *Rawlsian Principles*, in DEREK PARFIT, REASONS AND PERSONS, appendix H (1984) (observing an important, but subtle conceptual distinction between Rawls’s difference principle and maximin).

108. See John C. Harsanyi, *Can the Maximin Principle Serve as a Basis for Morality? A Critique of John Rawls’s Theory*, 69 AM. POL. SCI. REV. 594 (1975). Much of this criticism, however, overlooks the conditions that Rawls presupposed for appropriate use of the maximin principle: settings of true uncertainty involving a worst-case outcome of “grave risks” which could be avoided by sacrificing a potential gain that is of comparatively insubstantial moment. PP proponents believe that current environmental policy issues such as climate change fit these conditions well. See *supra* text accompanying notes 101-104.

quires officials to abandon the quest for optimization in favor of less ambitious, more pragmatically sensible approaches. Of course, the extreme conservatism of these approaches begs the questions of when and how to relax their dictates in favor of more permissive standards. According to many PP supporters, however, fostering such an adaptive approach to risk regulation is precisely the point of the PP—something that the principle’s critics seem reluctant to acknowledge. Unlike the optimization framework of CBA, which must resort to awkward analytical devices in the presence of imperfectly characterized risks, the PP’s incremental approach reflects great sensitivity to the fact that effective decisionmaking in the face of many problems demands *procedural rationality*.¹⁰⁹

The policymaking paradigm of “adaptive management” often is seen as a natural candidate to provide the kind of incremental, dynamic decisionmaking procedure envisioned by PP proponents.¹¹⁰ Pioneered by biologist C.S. Holling,¹¹¹ adaptive management is an application of “the concept of experimentation to the design and implementation of natural-resource and environmental policies.”¹¹² Because uncertainty and evolutionary change are presumed to be foundational characteristics of both biophysical and sociolegal systems, the adaptive management approach does not seek to identify static “optimal” equilibria. Instead, it aims to utilize constant feedback and experimentation in order to ensure the long-run sustainability of vital ecological processes. The concept of sustainability, in turn, entails judgments that cross not only the boundaries between scientific disciplines, but also the real and imagined boundaries that exist between science and politics.¹¹³ The

109. See BRIAN J. LOASBY, CHOICE, COMPLEXITY AND IGNORANCE: AN ENQUIRY INTO ECONOMIC THEORY AND THE PRACTICE OF DECISION-MAKING 220 (1976) (“A theory which takes serious account of time and ignorance must be a theory of processes, not of states—not even of dynamic states.”); Schrader-Frechette, *supra* note 33, at 27 (“Decision-theoretic rules under uncertainty require scientists to take account of the fairness of the allocation process, not merely the *outcomes*.”).

110. See A. Dan Tarlock, *Is There A There There In Environmental Law?*, 19 FLA ST. U. J. LAND USE & ENVTL. L. 213, 252 (2004) (“The precautionary principle needs to be linked to the idea of adaptive management. The existence of monitoring and adaptive feed-back mechanisms should be a major factor in validating the decision to limit an activity when the adverse impacts are uncertain.”).

111. See ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT (C.S. Holling ed., 1978).

112. See KAI N. LEE, COMPASS AND GYROSCOPE 53 (1993). See also JOHN COPELAND NAGLE & J.B. RUHL, THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT (2002); Norman L. Christensen, *The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*, 6 ECOLOGICAL APPLICATIONS 665 (1996) (describing ecosystem management as “driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function”).

113. See Kysar, *Sustainable Development*, *supra* note 46, at 2114.

ultimate aim of adaptive management, therefore, is the rather grandiose one of “integrat[ing] scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term”¹¹⁴

As part of this “complex sociopolitical and values framework,” proponents believe that the PP can play a central information-forcing role. Unlike their CBA counterparts, proponents of the PP recognize that uncertainty itself is a subject of power, influence, and control within economically advanced societies. Thus, the content of scientific knowledge and the manner of its production are not treated exogenously by the PP, but instead are made a central focus of the regulatory program. Shifting the burden of proof onto the promoters of new technologies and activities, as many proponents of the PP urge, serves the practical purpose of providing incentives for research and understanding by those parties who are thought to be best able to develop knowledge of imperfectly characterized threats.¹¹⁵ The CBA/risk assessment paradigm, in contrast, seems to assume that scientific uncertainty—the single most salient feature of environmental, health, and safety regulation—is simply addressed “out there.”¹¹⁶ Such epistemic bravado entails great opportunity costs, for the regulatory approval process itself can offer a powerful institutional mechanism for reducing the scientific uncertainties that riddle environmental, health, and safety law.¹¹⁷

III. THE PROBLEM OF VALUATION

One of CBA’s most vaunted virtues is its ability to synthesize vast amounts of empirical information regarding policy conse-

114. R. Edward Grumbine, *What is Ecosystem Management?*, 8 CONSERVATION BIOLOGY 27, 31 (1994).

115. See Amy Sinden, *Cass Sunstein’s Cost-Benefit Lite: Economics for Liberals*, 29 COLUM. J. ENVTL. L. 191, 194 (2004) (observing that precautionary regulatory approaches such as absolute standards “perform a crucial power-shifting function, leveling the political playing field between diffuse and powerless public interests and concentrated monied corporate interests”).

116. Cf. Wendy E. Wagner, *Commons Ignorance: The Failure of Environmental Law to Produce Needed Information on Health and the Environment*, 53 DUKE L. J. 1619, 1624 (2004) (criticizing “the failure of the environmental laws to require production of basic information about the harms caused by polluting activities and hazardous products”).

117. No doubt, proponents of optimization would protest that uncertainties exist on both the risk and the benefit side of such dilemmas. Market actors, however, already have strong incentives to demonstrate (and to capture) the benefits of their activities and technologies. See Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: A Response to Market Manipulation*, 6 ROGER WILLIAMS U. L. REV. 259, 271-72 (2000). In that sense, the PP’s asymmetry of regulatory concern can be seen as responding to an underlying asymmetry of knowledge incentives within the unregulated market.

quences into a single analytical framework. As Gödel famously demonstrated, however, no formal system of minimal complexity can be both consistent and complete.¹¹⁸ Because consistency generally is taken to capture the essence of rationality, practitioners of CBA typically respond to Gödel's challenge by sacrificing completeness; that is, they treat certain decision criteria as externally given in order to maintain the consistency of their CBA outputs.¹¹⁹ Thus, despite the widespread view that CBA encompasses a broader range of concerns than the PP, it is only the CBA procedure that *must*—by its very nature—ignore at least some parameters of a given decisionmaking context. Practitioners of CBA generally attempt to minimize this complication by exogenizing elements that are thought to be of little practical import or that are believed to be adequately addressed by other institutional mechanisms, such as the tax and transfer system. The problem with this otherwise sensible strategy is that, increasingly, CBA is being offered for use in choice settings, first, where the variables exogenized are of deep and unmistakable significance to the very decision under inspection and, second, where the potential role of alternative governance mechanisms is being displaced by the CBA exercise itself.

As described in the previous Part, questions concerning how the relevant political community should behave in the face of uncertainty regarding potentially irreversible or catastrophic consequences of human action are often subsumed by technical assumptions in risk-assessment and CBA procedures. Also missing or obscured are questions concerning, first, how the political community should respond to the fact that not only private values, but also social meanings, sometimes are affected by new technologies, shared experiences, or collective decisionmaking processes; and, second, how the community should regard non-nationals, future generations, and other interest-holders who are not already granted full membership in the community of individuals comprising the interest-optimization substrate. Both of these sets of questions require mechanisms for fostering democratic dialogue and

118. See Kurt Gödel, *On Formally Undecidable Propositions of Principia Mathematica and Related Systems*, in JEAN VAN HEIJENOORT, *FROM FREGE TO GODEL: A SOURCE BOOK ON MATHEMATICAL LOGIC* 178 (Harvard Univ. Press 1967). See also JOHN D. BARROW, *IMPOSSIBILITY: THE LIMITS OF SCIENCE AND THE SCIENCE OF LIMITS* 218-247 (1998); PAUL W. GLIMCHER, *DECISIONS, UNCERTAINTY, AND THE BRAIN: THE SCIENCE OF NEUROECONOMICS* 72 (2003); Guiseppe Dari Mattiacci, *Gödel, Kaplow, Shavell: Consistency and Completeness in Social Decisionmaking* (George Mason Sch. of Law & Econ. Working Paper Series, Paper No. 03-55, 2004) available at <http://ssrn.com/abstract=470122>.

119. Cf. CLIVE L. SPASH, *GREENHOUSE ECONOMICS: VALUES AND ETHICS* 267 (2002) (“Optimality . . . is in fact consistency analysis and the best outcome is not guaranteed by the model, but only the choice that is consistent with the assumptions.”).

developing new collective norms of responsibility. Yet, as this Part demonstrates, the questions are taken by CBA as having already been essentially answered.

A. Emergence

CBA practitioners generally adopt a preferentialist account of welfare in which individuals' expressed, revealed, or hypothesized preferences are taken to supply the exclusive criterion for valuing the expected consequences of social choice. Yet, as Mark Sagoff has argued, CBA practitioners have no non-normative procedure for deriving individual preference functions.¹²⁰ That is, despite the oft-heard claim that revealed preference studies represent "*in fact* reflections of individual preferences, and hence utility,"¹²¹ the interpretation of observed behavior is actually a slippery exercise in which the analyst must adopt a series of assumptions about the available opportunities and choice criteria that confront observed individuals. At times, these assumptions appear to rest more on personal introspection and professional custom than on sustained engagement with the actual circumstances of observed individuals. As Sagoff puts it, "[c]hoice is at best a conceptual construct inferred from ad hoc descriptions of behavior—descriptions that themselves presuppose beliefs about available options and therefore about preferences."¹²²

To give one pertinent example, many of the data interpretation challenges found in employment market value-of-life studies—which provide empirical estimates for use in policymaking of individuals' willingness-to-pay to avoid risks of death or injury to themselves—arise from the fact that the United States has managed to drastically reduce its occupational hazard levels over the course of the past century. For this reason, the remaining segments of the economy that exhibit an occupational mortality rate high enough to support the wage-risk premium methodology tend to be segments populated by those with the least social, economic, and political capital—variables that themselves can be expected to influence the opportunity set and the resulting preference orderings of observed individuals.¹²³ Thus, what the CBA analyst re-

120. See MARK SAGOFF, PRICE, PRINCIPLE, AND THE ENVIRONMENT 57-79 (2004).

121. W. Kip Viscusi, *Risk Equity*, 29 J. LEGAL STUD. 843, 849 (2000) (emphasis added). Compare Amartya Sen, *Rational Fools*, in CHOICE, WELFARE, AND MEASUREMENT 84-106 (1982).

122. SAGOFF, *supra* note 120, at 77.

123. According to one study, for instance, the implicit value-of-life revealed by wage-risk interactions appears to be several million dollars higher for union workers than for non-union workers, holding constant other significant variables. See Peter Dorman & Paul

gards as choice (and hence preference (and hence utility)), may actually capture in part the analyst's inclination to treat pre-existing power relations in employment markets as normatively privileged.¹²⁴

Further room for confusion under CBA arises from the counterfactual nature of opportunity cost assessment.¹²⁵ In one prominent study of climate change, for instance, the analyst's decision to add a variable representing enhanced recreation opportunities in a warmer world resulted in monetized benefits that tended to swamp the impact of estimated morbidity and mortality.¹²⁶ Apart from being unduly wooden—why assume, after all, that individuals will continue to value mountain biking at the same amount if they know that their extra days of recreation have been funded through an increase in malaria among the equatorial poor?¹²⁷—this exercise also is open to considerable selection bias. In a real sense, climate change has the potential to affect every biophysical and sociolegal system on the planet, systems about which our present understanding is highly incomplete and imperfect. To choose among such effects and offer the resulting calculation as comprehensive is convincing, one suspects, only because the ritual comports with our deeply ingrained desire to imagine our most difficult policy choices as purely scientific or technical in nature.

This is not to suggest that the analyst *could*, even in theory, conduct a thoroughgoing preferentialist account of climate change. The degrees of uncertainty in the relevant parameters—and the degrees of freedom available to the cost-benefit analyst in choosing which aspects of which systems to hold constant—render the pro-

Hagstron, *Wage Compensation for Dangerous Work Revisited*, 52 *INDUSTRY & LABOR RELATIONS REV.* 116, 133 (1998). See also Viscusi, *supra* note 121; ACKERMAN & HEINZERLING, *PRICELESS*, *supra* note 23, at 79; SIDNEY A. SHAPIRO & ROBERT L. GLICKSMAN, *RISK REGULATION AT RISK: RESTORING A PRAGMATIC APPROACH* 99-100 (2003).

124. Indeed, whether or not preferentialist in form, the reference case for defining and measuring welfare consequences of social choice tends to remain unequivocally focused on the status quo under CBA. See, e.g., U.S. FISH & WILDLIFE SERV., *DRAFT ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE RIO GRANDE SILVERY MINNOW*, FINAL DRAFT (May 2002), cited in Amy Sinden, *The Economics of Endangered Species: Why Less is More in the Economic Analysis of Critical Habitat Designations*, 28 *HARV. ENVTL. L. REV.* 129, 169-170 ("The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation.").

125. Cf. James M. Buchanan, *Introduction: L.S.E. Cost Theory in Retrospect*, in *L.S.E. ESSAYS ON COST* 1, 15 (James M. Buchanan & G.F. Thirlby eds., 1981) ("[T]he opportunity cost involved in choice cannot be observed and objectified and, more importantly, it cannot be measured in such a way as to allow comparisons over wholly different choice settings.").

126. See SPASH, *supra* note 119, at 170-171 (describing WILLIAM D. NORDHAUS, *NEW ESTIMATES OF THE ECONOMICS IMPACTS OF CLIMATE CHANGE* (1998)).

127. See *infra* text accompanying note 179.

ject all but impossible. Moreover, it may well be that public policy choices of a certain scale or normative significance simply exceed the capabilities of CBA's methodological individualism. That is, just as certain attributes and behaviors of complex, adaptive biophysical systems cannot be predicted by examining individual system components alone, certain values and aims of the "social organism"¹²⁸ might not be capable of being identified or predicted through the simple aggregation of atomized preferences or interests.¹²⁹ Instead, those values and aims might in part *emerge* through the operation of social institutions and procedures themselves. As Laurence Tribe observes, "the whole point of personal or social choice in many situations is not to implement a given system of values in light of the perceived facts, but rather to define, and sometimes deliberately to reshape, the values—and hence the identity—of the individual or community that is engaged in the process of choosing."¹³⁰

Collective procedures of this nature tend to be seen as illiberal or paternalistic. It is true, of course, that "[i]f regulators reject people's *actual* judgments, then they are insulting their dignity."¹³¹ Yet there is also insult in attributing meaning and significance to behavior that individuals themselves may not desire or intend. For many pressing environmental and risk regulation issues, individual preferences are likely to be non-existent or ill-formed in the absence of an appropriate forum for discussing and determining social goals. For instance, simply toting up the "revealed" preferences of individuals regarding the myriad potential consequences of cloning livestock for human consumption¹³² seems, at least at present, to be a contrived exercise. We will not know our preferences with respect to cloned livestock unless and until we have a body of relevant experience from which to draw upon in our evaluations. Such experience will only occur with the *prior* consent

128. *Id.*

129. Consider, for instance, the finding that individuals are willing to trade off the absolute number of lives saved by a program in favor of the proportion of lives saved from some identified reference group. See Karen E. Jenni & Geoge F. Loewenstein, *Explaining the Identifiable Victim Effect*, 14 J. OF RISK AND UNCERTAINTY 235, 254 (1997) [hereinafter Jenni & Loewenstein, *Explaining*]. Researchers typically describe such findings as evidence of cognitive "bias" or error on the part of subjects. A more sympathetic interpretation, however, is that the introduction of reference groups into the experimental design provides subjects with an avenue—however thinly specified—for expressing the variety of socially-inflected concerns that pervade risk regulation and that render simple body-counting exercises hopelessly artificial.

130. Laurence H. Tribe, *Policy Science: Analysis or Ideology?*, 2 PHIL. & PUB. AFF. 66, 99 (1972).

131. Sunstein, *Cost-Benefit Analysis and the Environment*, *supra* note 35, at 24 (emphasis added).

132. See *supra* text accompanying note 71.

of our political community, whether actively or passively granted. Thus, except perhaps as a method of curtailing collective debate, it makes little sense at present to hinge policies regarding cloned livestock on our assumed preferences.

This potential deliberative deficit of preferentialism is also evident in Judge Posner's recent use of CBA to suggest that the optimal post-Katrina reconstruction plan for New Orleans is one in which "the historic portions of the city (the French Quarter and the Garden District) might be rebuilt and preserved as a tourist site, much like Colonial Williamsburg, without having to be part of a city."¹³³ Posner may well be right that the United States should not spend billions of dollars reconstructing New Orleans to its former scale, especially in light of projected sea level rises over the next century from climate change that would transform the city into an island. But the reason for this conclusion is not to be found in a CBA premised on the decontextualized preferences of individuals. Whatever pre-Katrina tourist behavior might suggest (for it is their disposable dollars that presumably are driving the conclusion that only the French Quarter and the Garden District are worth rebuilding), it is an open question whether individuals post-Katrina agree that they have little use for a revival of the Ninth Ward and other poor, racially-segregated areas of the city. To say nothing of the deeper issues of environmental justice raised by the Katrina tragedy, we understate the role of citizenship when we assume that shared experiences do not affect the preferences that we hold and the meanings that we attribute to our social world.

B. Membership

In addition to embracing a view of social choice as merely the aggregation of existing individual interests, CBA also begins with the assumption that all relevant interest-holders have been identified for purposes of aggregation. In many instances, however, environmental policymaking will be concerned precisely with determining which interest-holders are entitled to membership in the political community, and on what basis their interests are to be considered.¹³⁴ One long-recognized example concerns the selection of an appropriate stance toward animals and other non-human life

133. Richard A. Posner, *Katrina, Cost-Benefit Analysis, and Terrorism*, The Becker-Posner Blog, Sept. 4, 2005, available at http://www.becker-posner-blog.com/archives/2005/09/katrina_cost-be.html.

134. See MICHAEL WALZER, *SPHERES OF JUSTICE: A DEFENSE OF PLURALISM AND EQUALITY* (1983).

forms.¹³⁵ As this Section explains, certain other categories of interest-holders that are of special concern to environmental policymaking—including statistical victims, non-nationals, and members of future generations—find themselves ignored or devalued by the CBA procedure. To be clear, this is *not* to say that the precautionary approach provides more clear or appropriate guidance as to how to resolve the ethical and political issues raised by these missing interest-holders. The PP approach does, however, explicitly recognize the need for development of new norms of national, global, and intergenerational environmental responsibility. In contrast, CBA seems to offer the implicit message that our intellectual needs consist only of better data and more rigorous techniques of valuation.¹³⁶

CBA's deficits in this regards are well demonstrated by the procedure's treatment of consent to environmental risks. As noted above, CBA proponents often view labor market revealed preference studies as a sufficient basis for assuming individualized consent to the imposition of all manner of health and safety risks, a belief that in turn leads them to argue that CBA does not involve human life or health at all, but instead only the "monetary equivalents" of such values.¹³⁷ To the extent that they recognize the analytical leap implicit in this argument, proponents of CBA defend the leap by noting that most human health risks from environmental hazards are quite small and, thus, officials can assume that individuals hypothetically would consent to the risks for a price comparable to the implicit value of life that is derived from the wage-risk premium literature.¹³⁸ Not only does this defense fail to grapple with the fact that individual responses to even actuarially identical risks vary dramatically based on the risks' qualitative characteristics,¹³⁹ but it also ignores the fact that a variety of adverse health risks associated with pollution and other hazards are *not* trivially small.¹⁴⁰ To abstract away from such qualitative

135. See generally ANIMAL RIGHTS: CURRENT DEBATES AND NEW DIRECTIONS (Cass R. Sunstein & Martha C. Nussbaum eds., 2004).

136. See Lisa Heinzerling, *Knowing Killing and Environmental Law*, 14 N.Y.U. ENVTL. L. J. 521 (2006).

137. See Eric A. Posner & Cass R. Sunstein, *Dollars and Death*, 72 U. CHI. L. REV. 537, 538 (2005).

138. See Sunstein, *Cost-Benefit Analysis and the Environment*, *supra* note 35, at 25 ("In many cases of environmental regulation . . . rights violations are not involved; we are speaking here of statistically small risks.").

139. For a recent and probing survey of issues related to the project of better "individuating" monetary values of statistical lives, see Cass R. Sunstein, *Valuing Life: A Plea for Disaggregation*, 54 DUKE L. J. 385 (2004).

140. See, e.g., Anne Rajotte, *Asthma and Pesticides in Public Schools: Does the ADA Provide a Remedy Where FIFRA Fails to Protect?*, 31 B.C. ENVTL. AFF. L. REV. 149, 153 (2004) (noting that childhood asthma rates have doubled over the past century, with 4.8

and quantitative features of risk in search of a uniform clearing price for life risks understating the profundity of collective decisionmaking regarding institutionalized harm.

CBA's limitations in this regard again seem to be driven by the procedure's purely individualistic conception of value. Without an identity—and therefore without a willingness or even an ability to pay for protection—those lives that are threatened by statistical risks seem not to represent human lives at all. Statistical risks, however, represent “none of us” and “all of us” at once.¹⁴¹ Because CBA refuses to see “all of us” as an interest-holder, it is incapable of treating environmental, health, and safety regulation with the moral richness that the subject deserves. As Lisa Heinzerling notes, by pricing human life and sanctioning actions that place it in jeopardy in advance of their occurrence, “the most basic kind of right—the right to be protected from physical harm caused by other people, on equal terms with other people—is denied to those whose lives are framed in statistical terms.”¹⁴² Rather than begin with a wholesale level of presumed consent to the imposition of risk, the PP instead begins with a strong entitlement to bodily integrity and ecological support, and a corresponding duty on the part of others to avoid causing serious or irreparable harm to those interests. Difficult questions of implementation and exception are immediately raised, but the baseline normative condition under the PP remains one of sanctity for human life, not vulnerability.

A similar tenuousness characterizes the position of non-nationals and other currently living individuals who stand outside of the particular political community that engages in a CBA policymaking exercise. After all, one cannot readily conduct a CBA to determine whether and how the interests of such individuals

million children presently affected, and that “[e]nvironmentally-related exacerbation is estimated to account for one third of childhood asthma cases”).

141. See Mari Matsuda, *On Causation*, 100 COLUM. L. REV. 2195 (2000); Keating, *Pricelessness*, *supra* note 23, at 174-75.

142. Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENVTL. L. REV. 189, 189-90 (2000). See also Frank I. Michelman, *Pollution as a Tort: A Non-Accidental Perspective on Calabresi's Costs*, 80 YALE L. J. 547 (1971). Psychologists uncover a similar disparity in the intuitive reactions of subjects to manipulations of the perceived “identifiability” of victims aided by policy proposals, see Deborah A. Small & George Loewenstein, *Helping “a” Victim or Helping “the” Victim: Altruism and Identifiability*, 26 J. OF RISK AND UNCERTAINTY 5 (2003), a finding related to the “reference group” effect describe above. See Jenni & Loewenstein, *Explaining*, *supra* note 129. Shi-Ling Hsu argues that this effect may be countered by the optimizing procedure of CBA, which specifically avoids hinging policy decisions on features of identity and agency. See Shi-Ling Hsu, *The Identifiability Bias in Environmental Law* (2005) (unpublished manuscript, on file with the author). As noted *infra* text accompanying notes 211-225, however, complete erasure of human identity and agency introduces its own undesirable distortions, the long-term cost of which may be literally incalculable, in the sense that it involves an impairment of our ability to coherently reason about—and to calculate—the moral implications of human behavior.

should be counted for purposes of conducting CBA.¹⁴³ Yet a great deal of environmental policymaking and the pursuit of sustainable development is bound up precisely with the challenge of perceiving and respecting the interests of globally dispersed populations—populations that, despite their political dispersion, nonetheless share elaborate networks of ecological and economic interdependence.¹⁴⁴ Increasingly, individuals are being asked by international environmental norm entrepreneurs to express regard and concern for the social and environmental conditions of other nations in their purchasing and other private decisionmaking.¹⁴⁵ The nation-state, however, remains the critical geopolitical actor for most of environmental law and regulation and, thus, any policy framework such as CBA that does not resolve how to address extrajurisdictional effects cannot be regarded as a comprehensive solution to environmental policymaking.¹⁴⁶

Finally, and most importantly, CBA's framework struggles to acknowledge future generations as interest-holders in themselves, rather than merely as objects of valuation by the presently living. Scholars have long acknowledged the theoretical difficulties presented by the topic of intergenerational justice,¹⁴⁷ many of which arise again from the fact that our bedrock normative theories tend to be liberal-individualistic in form. Like children, future generations are part of the "Achilles' heel" of liberalism¹⁴⁸—that vulnerable location for interest holders who are imperfectly situ-

143. See Eric A. Posner & Alan O. Sykes, *An Economic Analysis of State and Individual Responsibility Under International Law* (Univ. Chicago Law & Econ., Olin Working Paper No. 279, Stanford Law and Economics Olin Working Paper No. 318, 2006), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=885197.

144. See, e.g., THOMAS POGGE, REALIZING RAWLS 8-9 (1989) ("The effects of my conduct reverberate throughout the world, intermingling with the effects of the conduct of billions of other human beings We as individuals have no hope of coping with such complexity and interdependence if we take the existing ground rules for granted and merely ask 'How should I act?'").

145. See Kysar, *Preferences for Processes*, *supra* note 51.

146. Compare Exec. Order No. 12114, Environmental Effects Abroad of Major Federal Actions, Jan. 4, 1979 (requiring federal agencies to develop procedures for evaluating major federal actions that have significant extraterritorial environmental effects).

147. See, e.g., BRUCE A. ACKERMAN, SOCIAL JUSTICE IN THE LIBERAL STATE 202 (1980) (observing that the "problem of inheritance is of such great theoretical importance that we must confront it head-on if we hope to grasp the shape of liberal ideals"); DEREK PARFIT, REASONS AND PERSONS 351 (1984) (developing norms of intergenerational responsibility "is the most important part of our moral theory, since the next few centuries will be the most important in human history"); JOHN RAWLS, A THEORY OF JUSTICE 284 (1971) (observing that "the question of justice between generations . . . subjects any ethical theory to severe if not impossible tests"); Amartya K. Sen, *On Optimising the Rate of Savings*, 71 *ECON. J.* 479, 486 (1961) (observing that there can be no democratic solution to intergenerational problems); Lawrence B. Solum, *To Our Children's Children: The Problems of Intergenerational Ethics*, 35 *LOY. L.A. L. REV.* 163, 164 (2001) ("The problems of intergenerational ethics are notoriously some of the most difficult in moral and political philosophy.").

148. Steven Shiffrin, *Government Speech*, 27 *UCLA L. REV.* 565, 647 (1980).

ated to identify and assert their rights or interests in the manner that liberalism demands of them. Future generations are especially burdened in this regard, for not only are they non-existent, but they also are cognitively obscured even to those presently living, given liberalism's tendency to adopt one or another form of methodological individualism.

These limitations are well-demonstrated by what Derek Parfit has termed the *non-identity problem*: the fact that whatever policy is selected for a given issue may affect the very identity of future individuals.¹⁴⁹ The non-identity problem is related to, but distinct from, the problem of endogenous preferences, in which environmental policy is recognized to have profound effects on the preferences of individuals (including even those previously identified preferences that may have been used to determine the content of environmental policy).¹⁵⁰ In the intergenerational context, the problem is not merely that individuals' preferences shift as a result of policy choices, but that their very existence is made contingent on our choices. In such circumstances, we cannot say that future individuals will be made better or worse off by a policy choice, only that they will be made.

To the student of complexity theory, this problem of contingent identity is quickly recognized as a manifestation of the profound endogeneity and interconnectedness of complex adaptive systems; to the cost-benefit analyst, on the other hand, the problem appears fundamentally disruptive. Indeed, as Parfit notes, the non-identity problem poses deep conceptual challenges to any theory of normative ethics that is framed in terms of the rights, preferences, or interests of *particular* individuals.¹⁵¹ Such "person-affecting" normative theories provide little analytical traction in decisionmaking contexts where the relevant consequences will be felt by entirely different persons depending on how the decision is resolved. As a result, our moral thinking regarding such dilemmas is at present highly immature. It has, for instance, led to the con-

149. See PARFIT, REASONS AND PERSONS, *supra* note 147. See also Anthony D'Amato, *Do We Owe a Duty to Future Generations to Preserve the Global Environment?*, 84 AM. J. INT'L L. 190 (1990); Edith Brown Weiss, *Our Rights and Obligations to Future Generations for the Environment*, 84 AM. J. INT'L L. 198 (1990).

150. See MARK SAGOFF, THE ECONOMY OF THE EARTH: PHILOPOSHY, LAW AND THE ENVIRONMENT 63 (1988) (observing that "[o]ur decisions concerning the environment will . . . determine, to a large extent, what future people are like and what their preferences and tastes will be"); Talbot Page, *On the Problem of Achieving Efficiency and Equity, Intergenerationally*, 73 LAND ECON. 580, 591 (1997) ("How well the resource base is kept intact—how diminished it will be in biological diversity, how depleted in its soils, forests, groundwater, how crowded in population—will shape our grandchildren's prospects and values and in doing so will shape intergenerational society.").

151. See PARFIT, REASONS AND PERSONS, *supra* note 147, at 370-71.

clusions that we have no obligations to future generations whatsoever,¹⁵² or that we have only an obligation to ensure that our choices leave future generations with lives that are minimally worth living.¹⁵³

In order to avoid such unattractive conclusions, Parfit argues that we need to move beyond simple “appeal to what is good or bad for those people whom our acts affect,” and instead to begin developing methods of evaluating “different sets of possible lives.”¹⁵⁴ In the intergenerational environmental context, one promising mechanism for doing so is to conceive of the “communities which future people belong to [as] deserving of concern and respect in their own right.”¹⁵⁵ As discussed in Part III, the PP promotes just such a conception by establishing a standard of agent-relative environmental responsibility, in which human societies and generations are seen as distinct moral agents that stand in relations of responsibility and indebtedness to each other. Through such a partial concession to communitarianism, we can begin to harmonize our liberal individualistic ideals with the reality that some measure of paternalism and coercion is simply inescapable vis a vis future generations and other members of liberalism’s Achilles’ Heal.

CBA proponents instead try to address this dilemma through the use of an elaborate mathematical tool—the discount rate. Although a full discussion of the use of discounting in the intergenerational policy context is beyond the scope of this Article,¹⁵⁶ the practice does deserve brief mention because the effect of discounting future costs and benefits to a present value tends to swamp all other variables within long-term CBA.¹⁵⁷ Of the various normative justifications that have been offered for the use of discounting, the most substantively significant is based on the idea that, unless future costs and benefits are discounted according to a rate that reflects the return on investment offered by alternative uses of public funds, society will fail to maximize its welfare over

152. See S.A. Marglin, *The Social Rate of Discount and the Optimal Return of Investment*, 77 Q. J. ECON. 97 (1963).

153. See T. Schwartz, *Obligations to Posterity*, in OBLIGATION TO FUTURE GENERATIONS (R.I. Sikora & Brian Barry eds., 1978).

154. See PARFIT, REASONS AND PERSONS, *supra* note 147, at 377-78.

155. E. Page, *Global Warming and the Non-Identity Problem*, in SELF AND FUTURE GENERATIONS: AN INTERCULTURAL CONVERSATION 107, 123 (T.C. Kim & R. Harrison eds., 1999) (emphasis omitted).

156. For an overview of the discounting debate and an argument that discounting in the intergenerational policy context lacks a coherent normative justification, see Douglas A. Kysar, *Discounting, On Stilts*, 74 U. CHI. L. REV. __ (forthcoming 2007) [hereinafter Kysar, *Discounting*].

157. See SPASH, *supra* note 119.

time. Thus, the reduction of future consequences to a present value is thought to ensure that policymakers will remain mindful of the opportunity costs of regulation, a practice that is said to be temporally neutral because it leads to the overall maximization of social welfare, regardless of how that welfare happens to be distributed across time.

This conventional justification for the use of discounting within CBA falters when policymaking includes significant intergenerational effects, for the very values that are to be discounted depend on the specification of a background distribution of rights and responsibilities across generations. Much of environmental law and policy can be thought of as concerned directly with the establishment of that background distribution.¹⁵⁸ Thus, we should be skeptical of the contention that “the debate over [intergenerational equity] should be separated from the debate over discounting,”¹⁵⁹ given that the latter so heavily depends on the former. Through discounting, the fundamental issue of intergenerational equity—which risks and resources, as an ethical matter, should be imposed or bestowed on future generations?—is conflated with the issue of intergenerational efficiency—which generation, as a technical matter based on a given rate of discount and distribution of resource entitlements, does or will derive more utility from the use of a given resource? Future generations, in essence, are forced to “outbid” present owners by an amount reflecting not only the strength of their needs, but also the alternative uses to which all resources—including the “monetary equivalents” of their own lives—could be put during the intervening time periods.

C. Discursive Rationality

As noted above,¹⁶⁰ the contention of PP proponents that environmental, health, and safety decisionmaking is characterized by abiding uncertainty does not commit them to the extreme conservatism of the maximin approach as a general or permanent response. Rather, the PP is intended to commence a program of risk regulation that is both proportionate to the scope of the perceived threat and capable of being updated and adjusted over time. Proponents of the safe minimum standards approach within environmental economics also tend to qualify their position, arguing that

158. See Kysar, *Discounting*, *supra* note 156.

159. Cass R. Sunstein & Arden Rowell, *On Discounting Regulatory Benefits: Risk, Money, and Intergenerational Equity*, 74 UNIV. CHI. L. REV. (forthcoming 2007) (manuscript at 22, on file with author).

160. See *supra* text accompanying notes 37-38.

fidelity to safe minimum standards should yield when the costs of precaution become “immoderate”¹⁶¹ or “unacceptably large.”¹⁶² Within the legal literature, Dan Farber similarly allows for departure from his strong “environmental baseline” approach to policy-making “when costs would clearly overwhelm any potential benefits” from precautionary regulation.¹⁶³

Although critics sometimes argue that these various safety valves suggest a latent efficiency criterion within the precautionary approach,¹⁶⁴ there are important distinctions that prevent the PP from collapsing into CBA, even granting the addition of some form of cost sensitivity. To begin with, the PP’s understanding of cost is much broader than the notion presupposed by CBA.¹⁶⁵ As Bishop wrote in a seminal article on the safe minimum standards approach to endangered species protection, the determination of “[h]ow much [cost] is ‘unacceptably large’ must necessarily involve more than economic analysis, because endangered species involve issues of intergenerational equity.”¹⁶⁶ Similarly, advocates of the PP typically contemplate an inclusive process for making determinations about how to apply the principle, suggesting that the decision to relax its dictates can and should be premised on a range of appropriate reasons beyond simply welfare-maximization.¹⁶⁷ Given the ethical implications of such determinations, PP proponents are simply unwilling to replace considered, democratic judgments with mechanical devices such as risk aversion or option value premiums. Instead, such judgments are seen as unavoidably contingent and case-specific.¹⁶⁸

161. Ciriacy-Wantrup, *supra* note 103, at 252.

162. R.C. Bishop, *Endangered Species and Uncertainty: The Economics of a Safe Minimum Standard*, 60 J. AM. AG. ECON. 10, 13 (1978). Bishop clearly incorporates sensitivity to opportunity costs in his temperance of the safe minimum standards approach: “To get at total social costs [of implementing the safe minimum standard], any measurable benefits of conservation efforts must be subtracted from out-of-pocket and opportunity costs.” R.C. Bishop, *Endangered Species: An Economic Perspective*, quoted in Tom W. Crowards, *Safe Minimum Standards: Costs and Opportunities*, 25 ECOL. ECON. 303, 304 (1998).

163. See DANIEL A. FARBER, *ECOPRAGMATISM: MAKING SENSIBLE ENVIRONMENTAL DECISIONS IN AN UNCERTAIN WORLD* 201 (1999).

164. See, e.g., J. Rolfe, *Ulysses Revisited—A Closer Look at the Safe Minimum Standard*, 39 AUSTRALIAN J. AG. ECON. 55 (1995).

165. See Communication from the Commission, *supra* note 37, at 19 (“Examination of the pros and cons cannot be reduced to an economic cost-benefit analysis. It is wider in scope and includes non-economics considerations.”).

166. Bishop, *supra* note 162, at 10.

167. See, e.g., Nicholas Ashford et al., *Wingspread Statement on the Precautionary Principle* (1998), available at <http://www.gdrc.org/u-gov/precaution-3.html> (“The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties.”).

168. Cf. Case T-13/99, *Pfizer Animal Health S.A. v. Council*, 2002 E.C.R. II-3305, ¶¶ 160-61 (describing application of the PP as a “balancing exercise” that depends on “the particular circumstances of each individual case”).

Even if mechanical devices of the kind sought by CBA proponents could be identified, the cost-benefit procedure still would fail to register the sense of regret that accompanies risk regulation's tragic choices and that compels more searching inspection of how to design a society in which such choices are not as starkly and pervasively posed.¹⁶⁹ Lives lost under the "do the best you can" heuristic and other precautionary approaches are not viewed as efficient "tradeoffs," accepted in exchange for whatever utility has been gained. Instead, they are viewed as tragic, regrettable consequences of human fallibility and finitude—a "moral remainder"¹⁷⁰ that provides enduring motivation for surviving members of society to seek ways of doing better in the future. In contrast, because it aspires to comprehensive rationality, CBA must invariably round this moral remainder to zero. In the process, it must also fail to encourage an appropriate degree of collective self-awareness regarding the deep normativity of risk regulation.

A key benefit of the PP, therefore, is that it contains a built-in sensitivity to the need for collective deliberation. Even if we know that the PP's more severe implications will need to be relaxed, the principle nevertheless forces societal discussion regarding the normative status of statistical victims, other societies, and future generations.¹⁷¹ In that regard, the PP's insistence that human health and the environment deserve constant, anticipatory attention serves as a procedural lever for furthering still-nascent attempts to reason through important questions that lie at the "frontiers of justice"—questions about our responsibilities to members of other nations, other generations, and other species.¹⁷² Such an approach therefore aspires not only to be procedurally rational (e.g., in the sense that dynamic, incremental management approaches are demanded in the face of complexity and uncertainty in biophysical and sociolegal systems¹⁷³), but also to be *discursively rational* (e.g., in the sense that the PP helps to structure and promote collective deliberation regarding decisions for which our ex-

169. See Martha C. Nussbaum, *The Costs of Tragedy: Some Moral Limits of Cost-Benefit Analysis*, 29 J. LEGAL STUD. 169 (2000).

170. Daniel Markovits, *Legal Ethics and the Lawyer's Point of View*, 15 YALE J.L. & HUMAN. 209, 231. See also GUIDO CALABRESI & PHILIP BOBBIT, TRAGIC CHOICES 32 (1978) (referring to "the costs of costing" as "the external costs . . . of market determinations that say or imply that the value of a life or of some precious activity integral to life is reducible to a money figure").

171. Cameron, *supra* note 41, at 292 (arguing that the PP, "by explicitly noting the limits of scientific determination, . . . legitimates public political determination [of risk regulation issues]").

172. Cf. MARTHA C. NUSSBAUM, FRONTIERS OF JUSTICE: DISABILITY, NATIONALITY, SPECIES MEMBERSHIP (2006).

173. See *supra* text accompanying notes 109-117.

isting, individualized preferences are either ill-formed or ill-suited for the decision under inspection).

Of course, the PP's desire to encourage inclusive and robust deliberation may not easily comport with its desire to allow flexible, dynamic regulatory processes. As J.B. Ruhl has observed, adaptive management may well be inconsistent with traditional administrative law mechanisms for ensuring robust public participation in regulatory decisionmaking.¹⁷⁴ Moreover, some proponents of adaptive management appear to envision an expansive *normative* role for the experts who are placed in charge of ecosystem management.¹⁷⁵ Thus, whether by dint of a mismatch between adaptive management and the cumbersome processes of public participation, or by dint of an increasing willingness among experts to inject their normative views into the management process itself, the goals of procedural and discursive rationality may well be in tension with each other, even on the more populist-oriented precautionary approach. A critical task for environmental law going forward, therefore, will be to identify an appropriate division of labor between expert adaptive managers and the broader political community that enlists their aid in the pursuit of sustainable development.

IV. THE PROBLEM OF AGENCY

At bottom, the distinction between CBA and the PP reflects a distinction between agent-neutral and agent-relative conceptions of risk regulation. CBA aspires to achieve complete agent-neutrality at the level of the political community by disclaiming

174. See J.B. Ruhl, *Regulation By Adaptive Management: Is It Possible?*, 7 MINN. J. L. SCI. & TECH. 21 (2005).

175. That is, recognizing that human values, choices, and activities inevitably impact the objects of their study, they contend that "the notion of a pristine objective scientific observer, is not applicable to the study of self-organising systems." James Kay & Eric Schneider, *Embracing Complexity, The Challenge of the Ecosystem Approach*, in PERSPECTIVES ON ECOLOGICAL INTEGRITY 49 (L. Westra & J. Lemons, eds. 1994). Instead, they argue that scientists should take deliberately normative positions with respect to those human values, choices, and activities that impact ecosystem integrity. See, e.g., G.K. Meffe & S. Viederman, *Combining Science and Policy in Conservation Biology*, 23 WILDLIFE SOCIETY BULLETIN 327 (1995) ("Scientists can take a clear stand that biodiversity is good, that functioning and intact ecosystems are good, that continued evolutionary change and adaptation are good, and that diversity and variation in general is good. Scientists cannot and should not remove themselves from these usually unstated value judgments."). Others argue that the fact-value distinction, however philosophically troubled, must remain nominally intact in order to safekeep the professional authority and deference traditionally accorded to scientists. See R.T. Lackey, *Seven Pillars of Ecosystem Management*, 40 LANDSCAPE & URBAN PLANNING 21, 25 (1998) ("Ecosystem management should maintain ecosystems in the appropriate condition to achieve desired social benefits; the desired social benefits are defined by society, not scientists.").

the relevance of any normative considerations beyond the welfare impacts of regulatory decisions on individual members of the community. Collective values or aims, in other words, play no role in the CBA exercise, apart from the foundational choice to fix collective decisionmaking upon the aggregation of individual welfare consequences. As Parts I and II demonstrate, however, CBA must resort to controversial assumptions and exclusions in order to maintain the perception that discretionary choices are not being made within its framework.

As an indication of the degree of confusion in this area, some CBA proponents attempt to deny that individual welfare maximization is a moral choice at all. They state, for instance, that their analysis of “risk equity will not be from the standpoint of moral criteria but rather social welfare maximization.”¹⁷⁶ Similarly, they express a belief that “the moral debates” over discounting in the intergenerational policy context can be bracketed by “investigating people’s actual preferences in this domain.”¹⁷⁷ The analyst wants to reassure observers that CBA consists of a “technical” and “objective” task of identifying and tabulating welfare consequences of policymaking, but any effort to actually define, construct, and implement a social welfare function entails extraordinarily difficult normative—and political—judgments. After all, the dichotomy of fairness versus welfare only arises after the analyst has *first* defined welfare using criteria of justice . . . and fairness.¹⁷⁸

These are familiar debates. As this Part observes, however, there is an even more fundamental problem with CBA’s attempt to disclaim its own normativity. By analogizing from the metaethical construction of individual moral agency, this Part suggests that CBA’s project may ultimately be self-undermining in that it serves to erase the kinds of conceptual distinctions that are necessary in order to preserve the sense that a political community should engage in decisionmaking of any sort. That is, because an essential premise of CBA is that collective choice should passively and impartially trace the results of an individualized welfare calculus, government policies on the CBA account are not attached to any identifiable agent who bears responsibility for their content or effect. Ultimately, this attempt to “regulate from nowhere” may be just as tenuous and self-defeating as moral philosophers have deemed the attempt to fix individual decisionmaking solely on an

176. Viscusi, *Risk Equity*, *supra* note 121, at 844.

177. Sunstein & Rowell, *supra* note 159, manuscript at 5.

178. *Compare* LOUIS KAPLOW & STEVEN SHAVELL, *FAIRNESS VERSUS WELFARE* (2002).

impartial assessment of consequences.¹⁷⁹ In both contexts, the attempt to eliminate discretion through a formalized choice calculus inadvertently risks eliminating the basis on which the deciding agent has come to view the choice-making context as significant, as somehow worthy of governing criteria of any sort.

The PP, in contrast, offers a simple but meaningful acknowledgment both of the distinctiveness of political communities and of the overwhelming challenge of guiding their collective choices within a world of complexity, uncertainty, and interdependency between human individuals, societies, and generations. As will be argued, the PP's apparent qualitative distinction between risks imposed and benefits foregone does not represent an inexcusable ignorance of opportunity costs, as critics claim, but rather a subtle reminder that public policymaking is at bottom an act of collective responsibility. As argued in Parts I and II, the CBA paradigm struggles to address many of the central questions raised by the sustainable development challenge, including most significantly the need to further our moral thinking concerning those interest holders who do not enter smoothly into conventional liberal frameworks. Thus, the PP's deliberate attempt to "get the social organism thinking"¹⁸⁰ may be desirable simply as a way of promoting the development of new norms of global and intergenerational environmental responsibility at a time when such development is sorely needed.

A. Partiality

The impartialist command of consequentialist-utilitarianism, which prescribes utility-maximizing behavior for individuals irrespective of whether the utility flows to their benefit or to others', has long been regarded as practically unlivable, however laudable its aim. The command also has long been regarded as conceptually problematic, in that it seems difficult to square a coherent, stable conception of individual agency with a normative ethical theory that denies the distinctiveness of any such agency. In other words, by forcing the individual to regard her actions as fundamentally *mundane*, in the sense that they are qualitatively indistinguishable from her omissions and, indeed, from all other causal forces, the impartialist command also seems to force her to

179. See Douglas A. Kysar & Ya-Wei Li, *Regulating from Nowhere: Domestic Environmental Law and the Nation-State Subject*, in GLOBALIZATION COMES HOME: HOW THE UNITED STATES IS BEING TRANSFORMED BY GLOBALIZATION (Beverly Crawford & Michelle Bertho, eds., forthcoming 2007).

180. LOUIS MENAND, *THE METAPHYSICAL CLUB* 299 (2001) (quoting letter from John Dewey).

abandon the notion that her actions in any sense *matter*. Part of the reason for the cognitive attractiveness of agent-relative theories of individual ethics, then, lies in their ability to prevent our lives and our identities from receding entirely into the broader causal systems within which we are undoubtedly situated. As Bernard Williams famously argued, attaching some special moral significance to the affirmative expressions of an individual's particular agency enables the person to be "identified with his actions as flowing from projects and attitudes which in some cases he takes seriously at the deepest level, as what his life is about . . ."¹⁸¹

Complexity theory underscores the importance of this function by positing an expansive, yet simultaneously imperfect causal potential on the part of any single component within complex, adaptive systems. The challenge of crafting a moral identity within such a "complicated tissue of events"¹⁸² is especially profound: Not only does the individual face innumerable opportunities to act, but she also experiences her actions as deeply embedded within a causal order that belies the classical liberal belief in predictable dyadic causal relations.¹⁸³ Accordingly, under a duty of impartial optimization, the poet's "saddest" category—what "might have been"—becomes much more than simply a reflective indication of the challenge of crafting an identity in a world of indefinitely many causal opportunities. Instead, it becomes a reflexive imperative to act and choose in a manner that draws no boundaries between the human actor and the complex causal system within which she is situated. For this reason, deontologists hold onto much-maligned conceptions such as the act-omission distinction. Despite being endlessly manipulable¹⁸⁴ and seemingly tolerant of unacceptable results in particular cases,¹⁸⁵ such distinctions ultimately help to preserve a coherent, stable conception of individual moral agency.

Consequentialist-utilitarians, on the other hand, regard the act-omission distinction and other familiar manifestations of agent-relative ethics as evidence of cognitive "bias"¹⁸⁶ that should

181. Bernard Williams, *A Critique of Utilitarianism*, in *ETHICS: HISTORY, THEORY, AND CONTEMPORARY ISSUES* 567, 582 (Steven M. Cahn & Peter Markie eds., 1998).

182. WERNER HEISENBERG, *PHYSICS AND PHILOSOPHY* 96 (1958).

183. Cf. Mark Kelman, *The Necessary Myth of Objective Causation Judgments in Liberal Political Theory*, 63 *CHI.-KENT L. REV.* 579 (1987) (describing the inability of dominant liberal political theories to account for problems of indeterminacy in establishing causal relations).

184. See Mark Kelman, *Taking Takings Seriously: An Essay for Centrists*, 74 *CAL. L. REV.* 1829 (1986) [hereinafter Kelman, *Taking Takings Seriously*].

185. See Peter Singer, *Famine, Affluence, Morality*, 1 *PHIL. & PUB. AFF.* 229 (1972).

186. See Robert A. Prentice & Jonathan J. Koehler, *A Normality Bias in Legal Decisionmaking*, 88 *CORNELL L. REV.* 583, 587 (2003) (describing the "omission bias" as "the tendency of people to find more blameworthy bad results that stem from actions than bad results that stem from otherwise equivalent omissions"); Laura Y. Niedermayer & Gretchen

be “escape[d].”¹⁸⁷ In a recent lecture, for instance, Cass Sunstein speculates that the deontological moral tradition—particularly as it is expressed in such principles as the prohibition on affirmatively acting to cause a loss of human life—arises not from a full-fledged, independent philosophical framework, but from the use of “moral heuristics . . . or rules of thumb, that work well most of the time, but that also systematically misfire.”¹⁸⁸ And, indeed, Sunstein believes that the Kantian prohibition on knowingly taking innocent human life misfires, “at least [when] the deaths are relatively few and an unintended byproduct of generally desirable activity.”¹⁸⁹ Instead, he argues that the normativity of action should be determined by a full and impartial evaluation of its expected consequences on relevant interest-holders.

As Samuel Scheffler has explained, however, a normative standard of “instrumental optimality” for individuals—which attaches no special significance to the actions, interests, or other features of the agent herself—must derive its moral attraction, paradoxically, from “considerations other than instrumental optimality.”¹⁹⁰ The contrary notion that instrumental optimality has primary normative significance faces inescapable complications. For instance, as decision theorists have demonstrated, there may be circumstances in which the deliberate attempt to optimize may not be the most sure route to optimization.¹⁹¹ Knowing when and how

B. Chapman, *Action, Inaction, and Factors Influencing Perceived Decisionmaking*, 14 J. BEHAV. DECISIONMAKING 295, 296 (2001) (defining the bias as “the tendency to judge actions as worse than omissions when they both have the same bad consequences”). Psychologists argue that the act-omission distinction reflects a cognitive bias because “[p]eople continue to distinguish acts and omissions . . . even when the feature that typically makes them different is absent.” Jonathan Baron, *Nonconsequentialist Decisions*, 17 BEHAV. & BRAIN SCI. 1, 3 (1994). Researchers argue, for instance, that the act-omission distinction arises from individuals’ tendency to perceive acts as more purposeful or intentional, and thus more blameworthy, than omissions. Accordingly, they regard observed behavior as biased or over-generalized if subjects continue to exhibit an act-omission distinction even when experimenters manipulate perceived intentionality. See KEITH E. STANOVICH, WHO IS RATIONAL?: STUDIES OF INDIVIDUAL DIFFERENCES IN REASONING 195 (1999). As this Section argues, however, the distinction between acts and omissions for purposes of moral reasoning is far more basic than the omission bias literature appreciates, related as it is to the very notion of agency that grounds such reasoning. Experimental manipulation of intentionality or other presumed components of the distinction therefore should not be expected to lead to its complete erasure.

187. Jonathan Baert Wiener, *Beyond the Balance of Nature*, 7 DUKE ENVTL. L. & POL’Y F. 1, 16-17 (1996).

188. Cass R. Sunstein, *Moral Heuristics and Moral Framing*, 88 MINN. L. REV. 1556, 1558 (2004).

189. *Id.* at 1580.

190. Samuel Scheffler, *Doing and Allowing* 114 ETHICS 215, 232 (2004).

191. See Kysar et al., *supra* note 31 (arguing that psychologists and legal scholars have wrongly interpreted Herbert Simon’s notion of bounded rationality to consist simply of optimization under informational and cognitive constraints, rather than a more nuanced notion in which heuristic, non-optimizing decisionmaking procedures are evaluated for their “ecological rationality” in light of the actual environments in which they are utilized).

to depart from the optimization calculus in favor of more pragmatically sensible approaches therefore implies the existence of some independent agent responding to at least some additional normative criteria. Similarly, the desirability of holding oneself to a norm of instrumental optimality cannot be premised on a judgment that it is the instrumentally optimal thing to do—“if it did, one would need already to have accepted the norm in order to see oneself as having reason to accept it, which means that the proposed derivation is circular.”¹⁹² To avoid such circularity, one first must posit an independent human subject who views herself as peculiarly responsible for the affirmative expressions of her moral agency, in the sense that those expressions are guided by reasons that she *herself* has considered and chosen. That very brand of discretion, however, seems to be what impartial utilitarianism eliminates from our moral reasoning.

Scheffler’s argument bears some relationship to Daniel Markovits’s effort to construct an account of “the necessary architecture of the first person,” in which Markovits argues that any meaningful conception of personal moral agency must include a recognition of oneself not only as an agent responsive to reasons for acting, but also as a *generator* of reasons, including reasons that are intimately and uniquely one’s own.¹⁹³ While Scheffler argues that the mere fact that individuals view themselves as subject to moral norms of any sort implies that they must accept a distinction between their agency and the larger causal order, Markovits argues that a minimal logical requirement of individuals being able to coherently view themselves as moral agents is an ability to supply reasons for acting that are not solely dictated by an external normative theory, such as the optimization rubric underlying CBA. From either perspective, the rub is that by urging a standard of agent-neutral utilitarianism, causal optimizers also implicitly ask us to deny the belief that our judgments and our actions are morally distinctive—the very belief that seems to be a minimally necessary precondition for having reason to accept *any* theory of normative ethics.

Defenders of optimization might respond that the conceptual “separateness” of moral agents is maintained in their framework by the fact that the utilitarian calculus takes account of an individual’s own particular causal position and information set when calculating optimal courses of action. Optimizers, however, have no way of cabining their logic, for presumably individuals

192. Scheffler, *supra* note 190, at 232.

193. Markovits, *supra* note 170, at 249.

also should choose to position themselves within causal settings and to invest in obtaining information in a manner that is calculated to achieve optimal outcomes.¹⁹⁴ Soon enough, this duty of causal optimality becomes infinitely self-referential, and the individual becomes lost within a framework that achieves its goal of consistent moral treatment only by denying the very basis on which individuals have come to think of themselves as distinct moral agents.

Indeed, the optimization framework is not only unhinged—in the sense that it exogenizes the process by which its intended audience develops and maintains a sense of personal urgency concerning the framework's subject matter—but it also is expressed in a formal language that implicitly condemns the discretion and judgment of its subjects. Like any other theory of normative ethics, optimization depends for its relevance and coherence on the existence of agents who are empowered to respond to reasons for acting, including at least some reasons for acting that are entirely independent of an externally imposed normative framework.¹⁹⁵ Unlike theories of normative ethics that do not aspire to comprehensive rationality, however, the formal language of optimization by its very nature tends to disparage any such independent reasons for acting. That is, the formalized moral world of impartial optimization offers a series of stark choices: fairness *versus* welfare, precaution *versus* maximization, subjectivity *versus* rationality. Thus, although the optimization framework depends for its persuasiveness on the continued self-awareness and cognitive independence of the agents it seeks to persuade, its axiomatic structure simultaneously and unavoidably condemns those agents' independent judgment as leading to *sub*-optimal outcomes. Under such a conception, it is hard to imagine how individuals would continue to view themselves as distinctive moral actors who should abide *any* notions of virtue and responsibility.

B. Collectivity

Early domestic efforts to eliminate ozone-depleting substances in the United States were based largely on theoretical arguments as to their potential for harm, a classic example of pre-

194. *Cf. infra* text accompanying note 74 (describing a similar “optimal stopping problem” with respect to CBA and information costs).

195. *See* Markovits, *supra* note 170, at 227 (observing that consequentialism and other third-personal ethical theories fail to appreciate “the relation of authorship . . . that a person has to his own actions, a relation the person does not have to other people's actions, not even to those that he could have prevented”).

cautionary regulation in the face of incomplete information regarding potentially disastrous environmental harms. Years later, empirical investigations confirm the grounds of the scientific community's earlier concerns, and cost-benefit analyses now are capable of "verifying" the wisdom of that earlier precautionary action. Significantly, precautionary wisdom emerged at the time of that earlier action from a political body that saw itself as standing outside of, and being critically disposed toward, its tools of risk assessment and welfare maximization.¹⁹⁶ Indeed, at the time that the United States led the global effort to reduce the use of ozone-depleting substances, computer programs were rejecting satellite data on the extent of loss in the ozone layer as being too far from the range of expected results to be valid.¹⁹⁷

Today, the precautionary approach is derided by U.S. policy elites as a "mythical concept . . . like a unicorn."¹⁹⁸ Yet if the analysis of the previous Section translates at all smoothly from the individual to the collective context, then the precautionary approach makes a great deal more concrete sense than PP critics appreciate: Even granting the causal optimizer's claim that "risks are on all sides of social situations,"¹⁹⁹ that fact alone does not compel the adoption of an optimization standard, such as CBA, in which risks imposed and opportunities foregone are treated as analytically indistinguishable. Such a homogenized conception of the causal order threatens to undermine the basis on which moral agents have come to think of their actions as especially deserving of deliberation, choice, and responsibility. Put differently, no coherent conception of moral agency—even a collective one—can fully deny the distinctiveness of the agent's choices and actions in the manner compelled by impartial utilitarianism. Instead, something like the "first, do no harm" admonition of Hippocrates may be necessary at the collective level simply for the implicit reminder contained within it, that a political community's actions and decisions carry *distinctive* moral weight.

Of course, the desirable degree of agent-relativity for individual human actors does not necessarily supply the desirable de-

196. Cf. Frank Ackerman et al., *Applying Cost-Benefit Analysis to Past Decisions: Was Protecting the Environment Ever a Good Idea?*, 57 ADMIN. L.R. 155, 156 (2005).

197. Cf. SPASH, *supra* note 105, at 132.

198. McGarity, *MTBE*, *supra* note 23, at n. 323. John Graham, former head of the Office of Information and Regulatory Affairs for President George W. Bush's Office of Management and Budget, made the unicorn remark at a conference, organized in part by the European Commission, entitled "The US, Europe, Precaution and Risk Management: A Comparative Case Study Analysis of the Management of Risk in a Complex World." See http://www.whitehouse.gov/omb/infoereg/eu_speech.html (lasted visited Nov. 27, 2006).

199. Sunstein, *Beyond the Precautionary Principle*, *supra* note 13, at 1008.

gree for collective actors.²⁰⁰ Most basically, the classic objections to fully impartial utilitarianism—that it disrupts a life filled with projects and meaning,²⁰¹ or that it precludes special affiliations to family, friends, and colleagues²⁰²—seem inapplicable to an institution that is charged, not with crafting an individual identity, but with serving the collective good of society. Indeed, one might argue that such institutions should be conceived and operated without *any* distinction between the effects of their policies, and the effects that are attributable to the larger causal system within which they operate. Institutional responsibility instead should include the fate of the entire system, unmediated by the “raft of baggage of personal attachments, commitments, principles and prejudices” that comprise an individual’s narrative history.²⁰³

Practical considerations support this line of reasoning. Unlike individuals, who could never fulfill a duty of causal optimality with anything other than profound incompleteness,²⁰⁴ human groups and institutions are thought to be able to more perfectly realize such a duty. Institutional actors can promulgate rules and distribute costs in a broad-sweeping manner that individuals in their private lives could not replicate.²⁰⁵ Also, as phi-

200. See Sunstein & Vermeule, *Capital Punishment*, *supra* note 35, at 16 (noting that “[a] great deal of work has to be done to explain why ‘inactive,’ but causal, government decisions should not be part of the moral calculus”); Kelman, *Taking Takings Seriously*, *supra* note 184, at 1849-1851 (reviewing RICHARD A. EPSTEIN, *TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN* (1985)) (arguing that to translate individual rights and responsibilities uncritically to the collective sphere is to “reify like mad”); Forward, *PUBLIC & PRIVATE MORALITY* (Stuart Hampshire, ed.) (1978) (collecting papers by Stuart Hampshire, T.M. Scanlon, Bernard Williams, Thomas Nagel, and Ronald Dworkin regarding “the dividing line between private life and public responsibilities”).

201. See, e.g., George P. Fletcher, *On the Moral Irrelevance of Bodily Movements*, 142 U. PA. L. REV. 1443, 1451 (1994) (“There is nothing quite so unpredictable and insistent as having the circumstances determine when and how we must act.”); Bernard Williams, *A Critique of Utilitarianism*, in J.J.C. SMART & BERNARD WILLIAMS, *UTILITARIANISM FOR AND AGAINST* 116-117 (1973) (arguing that utilitarian demands of “optimific decision” constitute “in the most literal sense, an attack on [one’s] integrity,” and the ability to stably and coherently pursue a life of one’s own).

202. See SCHEFFLER, *supra* note 44, at 121 (arguing that “interpersonal relationships cannot play the fundamental role that they do in human life unless people treat their own relationships as independent sources of reasons for action.”); HENRY HAZLITT, *THE FOUNDATIONS OF MORALITY* 193 (1964).

203. ROBERT E. GOODIN, *UTILITARIANISM AS A PUBLIC PHILOSOPHY* 9 (1995). (“It is the essence of public service as such that public servants should serve the public at large.” *Id.*); Thomas Nagel, *Ruthlessness in Public Life*, in *PUBLIC & PRIVATE MORALITY*, *supra* note 200, at 75, 83 (“Public institutions are designed to serve purposes larger than those of particular individuals or families.”).

204. See SCHEFFLER, *supra* note 44, at 43 (noting that “the individual agent *qua* individual agent typically will have only the most limited opportunities to influence . . . global dynamics, and, indeed, cannot in general be assumed to have any but the sketchiest and most speculative notions about the specific global implications of his or her personal behavior.”).

205. See *id.* See also Kelman, *Taking Takings Seriously*, *supra* note 184, at 1851 (noting that states, as opposed to individuals, can more readily “state the scope of [positive]

philosopher Michael Green argues, “[i]nstitutions are better than individuals at collecting and processing information about the distant or indirect consequences of their actions.”²⁰⁶ Indeed, not only can institutional actors countenance a much greater spatial scope of concern than individuals, but they also can adopt a greater temporal scope of concern, given their legal immortality.²⁰⁷ For these reasons, one might well conclude that the criticisms traditionally lodged against utilitarianism for individuals fail to apply at the level of the nation-state and that, instead, an optimization rubric of the sort underlying CBA is desirable as a philosophy for government conduct.²⁰⁸

The metaethical points raised in the previous Section still remain, however, for some normative justification other than causal optimality is necessary to ground the conclusion that social actors should conform to an optimality standard. At bottom, the various arguments offered in favor of CBA reduce to statements that social actors and institutions can pursue causal optimality with fewer constraints and unintended side effects than individuals. Following Scheffler’s argument on the individual level, however, it is not enough to say that social actors and institutions should optimize simply because it is the socially optimal thing to do. Not only is this statement sometimes empirically false,²⁰⁹ but it also is conceptually problematic in that it is incapable of explaining the embedded assumption that social institutions *should* do anything—that is, that the decisionmaking of such institutions should be the subject of norms of any sort. The reason for *that* assumption is that we implicitly recognize such institutions as “separate” moral agents, rather than simply as passive instruments of optimization. That is, even when we try to program our institutions to be “hostage to what the facts turn out to show in particular domains,”²¹⁰ our very act of programming concedes the moral dis-

duties in administrable rule-like form” and utilize “a general system of taxation” to distribute the costs of fulfilling such duties in an equitable manner).

206. Michael J. Green, *Institutional Responsibility for Global Problems* 30 PHIL. TOPICS 79, 86 (2002), reprinted as *Institutional Responsibility for Moral Problems*, in GLOBAL RESPONSIBILITIES: SECURING RIGHTS BY DEFINING OBLIGATIONS 1117 (2005).

207. See GOODIN, *supra* note 203, at 129 (arguing that “public officials take a longer time horizon than do individuals planning their own private lives”); SCHEFFLER, *supra* note 44, at 39 (noting that individuals “tend to experience . . . causal influence as inversely related to spatial and temporal distance”).

208. See GOODIN, *supra* note 203, at 27 (concluding that “[t]he same thing that makes [moral] excuses valid at the individual level—the same thing that relieves individuals of responsibility [from a duty of causal optimality]—makes it morally incumbent upon individuals to organize themselves into collective units that are capable of acting where they as isolated individuals are not”); Nagel, *supra* note 203, at 84 (“Within the appropriate limits, public decisions will be justifiably more consequentialist than private ones.”).

209. See *supra* text accompanying notes 93-95.

210. Sunstein & Vermeule, *Capital Punishment*, *supra* note 35, at 30.

tinctiveness of our institutional creations—and the possibility that they might be programmed according to other visions of societal flourishing.

Deep below the push for CBA therefore seems to lurk the same conception of collectivity that the methodology's proponents regard as suspect within the PP. For either approach to have compelling, persuasive, or even recognizable significance as a standard of social choice, it is necessary first to conceive of human institutions and societies as distinctive agents that can respond to reasons, articulate goals, and maintain self-awareness regarding the moral urgency of social policies. A necessary predicate for *that* conception, in turn, is to reject CBA's insistence that social choice can be reduced to a ministerial act of aggregation. Try as we might to deny it, the embrace of "Government house utilitarianism" is much more than a practical decision involving the institutional satisfaction of individual interests. It is a choice that reveals something intimate and foundational about our collective moral identity—something that will be lauded, lamented, or viewed indifferently by future generations, but that will always be seen as uniquely *ours*. As described in the next Section, unlike CBA, the PP embraces this fact of collective self-determination, and opens up space to meet the profound responsibilities contained within it.

C. Moral Rationality

Contrary to prominent critiques, the PP does not require us to embrace a fallacious belief that the larger causal fabric is benevolent²¹¹ or that human omissions are perfectly innocuous.²¹² Nor does it necessitate a return to the mistaken view that we can identify a stable "balance of nature" that exists beyond the influ-

211. Critics often believe that adherence to the PP suggests that individuals naively regard the status quo, the non-human, or the "normal" causal order as benign. See Sunstein, *Beyond the Precautionary Principle*, *supra* note 13, at 1009 (arguing that the "mistaken belief that nature is essentially benign . . . often informs the precautionary principle"). Although most PP proponents harbor no such illusion, the more fundamental point is that *some* counterfactual baseline (such as the "normal" causal order absent one's actions) is necessary in order for any form of moral reasoning about human behavior to coherently proceed. See MOORE, *infra* note 212. After all, CBA has a baseline of its own, premised on a market liberal conception in which existing economic arrangements and preferences are given privileged status. See Kysar, *Sustainable Development*, *supra* note 41.

212. Michael Moore's contrary argument—that human omissions are "literally nothing at all"—seems just as difficult to sustain as the utilitarian notion that human actions are indistinguishable from other causal forces. MICHAEL MOORE, *ACT AND CRIME: THE PHILOSOPHY OF ACTION AND ITS IMPLICATIONS FOR CRIMINAL LAW* 28 (1993). In both cases, the critical missing element is an appreciation for the role played by human choice and agency. See Fletcher, *supra* note 201, at 1444 (arguing that "the only kind of omitting that is interesting is the kind in which human agency is expressed").

ence of humans.²¹³ Nor, finally, does the PP require that that we abandon the attempt to foster specific positive duties at the societal level (that is, institutional duties to act on the opportunity to prevent or alleviate suffering). The PP does, however, imply the view that human agents, whether individual or collective, bear moral responsibility in a way that other causal forces do not and, thus, that the decisionmaking of such agents should be conducted with a sense of moral urgency and self-awareness. Denying such a notion in favor of the fully impartial optimization rubric invites a slippery slope of instrumentalist decisionmaking in which moral boundaries are not only crossed routinely, but crossed without regret.

Some authors argue that a separate or distinct notion of collective agency in this manner “may not even be intelligible” and is, at least, of “obscure” moral relevance.²¹⁴ This argument, while correct to the extent that it recognizes a larger scope of causal potential and moral obligation for the prevention of suffering by institutional actors, overshoots to the extent that it draws no distinction whatsoever between a political community and the larger causal order. After all, the same challenge that exists on the individual level—the challenge of pursuing morally desirable outcomes when the agent’s causal potential both is filled with opportunities for acting and simultaneously is constrained by the omnipresence and power of other causal forces—also exists on the collective level. Even robust institutional actors such as nation-states confront a phalanx of forces that lie beyond complete prediction and control, such as the operations of natural systems that escape precise probabilistic understanding, the actions of foreign nations and other non-subjects that depend on and impact shared resources,²¹⁵ and the future needs and circumstances of unborn generations

213. See A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L. A. L. REV. 1121, 1122 (1994).

214. Sunstein & Vermeule, *Capital Punishment*, *supra* note 35, at 6.

215. A single “risk monster” nation, for instance, may threaten unpalatable consequences for global environmental problems such as climate change, just as one “utility monster” threatens unpalatable consequences on the individual level. Cf. ROBERT NOZICK, ANARCHY, STATE AND UTOPIA 110 (1974) (observing that “[u]tilitarian theory is embarrassed by the possibility of utility monsters who get enormously greater sums of utility from any sacrifice of others than these others lose”). In that respect, the fact that most of the industrialized world has pressed on with the Kyoto Protocol despite the overall tepidness of the document and the unwillingness of the United States to participate in the regime suggests that, to those nations, expected consequences do not fully determine the normativity of state action. Instead, the basis of climate policy in these nations seems to be a conviction that human societies and human generations owe each other certain moral responsibilities—responsibilities that must be discharged with care and caution in light of the deep uncertainty that accompanies global environmental disruption.

that are a necessary but unknowable feature of any policy decision involving intergenerational consequences.

At times, the challenge of defining and performing a political role within this context becomes dramatically apparent. In the aftermath of Hurricane Katrina, for instance, one anonymous White House official initially sought to deflect criticism of the Bush Administration's response by arguing, "Normal people at home understand that it's not the president who's responsible for this, it's the hurricane."²¹⁶ Four days later, with criticism mounting, President Bush embraced the opposite normative extreme, one in which the scope of the government's responsibility appeared to be co-extensive with the entire causal order: "[A]s long as any life is in danger, we've got work to do"²¹⁷ As a statement of government responsibility for hurricane prevention and disaster relief, the latter quotation seems more desirable than the former quotation, which trades on a strong prescriptive version of the act-omission distinction that should be rejected. What both quotations share, however, is an acknowledgment of the state as an independently significant moral actor, one for which even an apparent duty of comprehensive lifesaving can only be imposed as a result of reasoning, choice, and responsibility.

The PP embraces the distinctiveness of collective decision-making. The political community that adopts and implements a precautionary approach does so with a recognition of itself as a member of a larger geopolitical and temporal community of communities. On this account, risk regulation is not merely an opportunity to maximize an existing set of individual welfare functions, but rather a moment to consider the regulating body's obligations to its present and future members, to other political communities, and perhaps even to other species.²¹⁸ Such notions of decidedly col-

216. Scott Shane & Eric Lipton, *Government Saw Flood Risk But Not Levee Failure*, N.Y. TIMES, Sept. 2, 2005 (quoting a White House official "who asked not to be named because he did not want to be seen as talking about the crisis in political terms").

217. George W. Bush, Address to Volunteers at Evacuee Shelter in Baton Rouge, Louisiana (Sept. 5, 2005), available at <http://www.whitehouse.gov/news/releases/2005/09/20050905-9.html>.

218. See, e.g., Christopher D. Stone, *Should Trees Have Standing?--Toward Legal Rights for Natural Objects*, 45 S. CAL. L. REV. 450 (1972) (arguing that law can, and should, view animals and other natural objects as having value and dignity in their own right). One continues to find supporters of Stone's position in the environmental law literature. See, e.g., Alyson C. Flournoy, *In Search of an Environmental Ethic*, 28 COLUM. J. ENVTL. L. 63 (2003) (arguing that environmental ethics should play a stronger role in environmental law and policy); Alyson C. Flournoy, *Building an Environmental Ethic from the Ground Up*, 37 U.C. DAVIS L. REV. 53 (2003) (supporting a transition away from exclusively human-centered utilitarianism as the foundation of environmental policy). However, William F. Baxter's classic work articulating the anthropocentric view, *PEOPLE OR PENGUINS: THE CASE FOR OPTIMAL POLLUTION* (1974), seems to have had the more dominant impact on

lective responsibility are well demonstrated by the original German articulation of the PP, *Vorsorgeprinzip*, which translates literally as “beforehand or prior care and worry” and which includes notions of “caring *for* or looking *after*, fretting or worrying *about* and obtaining provisions, or providing *for*.”²¹⁹ Through these relational constructs, the PP offers a subtle, but constant reminder that the relevant political community’s decisions express a collective identity—an identity that the community must in an important and unavoidable sense *own*.²²⁰

Rather than emerge from collective deliberation by a political community, policies adopted under the CBA approach instead are said to “inevitably and predictably” flow from the calculated effects of state action.²²¹ Even assuming (unrealistically) that adequate knowledge *is* available to perform this ministerial conception of policymaking, it is unclear how CBA’s results can retain authority over time, given that the framework implicitly denies the distinctiveness of its own audience. That is, rather than appearing within the CBA framework as responsive—and responsible—subjects of moral reasoning, the individuals collectively comprising CBA’s political community instead appear as simply part of the furniture of the optimization paradigm, the underlying normativity of which is likely to become increasingly obscure over time. The end result of such a conception may be a form of moral anesthetizing,²²² one that occurs at precisely the moment when sensitivity and self-awareness regarding the deep uncertainty, complexity, and normativity of risk regulation are most in need.

This danger of moral anesthetizing seems to represent a problem not only for those who would invest CBA with foundational normative significance, but also for those who regard CBA simply as a decision procedure with practical worth in particular political settings. In Adler and Posner’s view, for instance, CBA does not have “bedrock moral status,” but instead serves only as a pragmatically useful mechanism for pursuing other values, such as overall well-being, that do have primary moral significance.²²³ The underlying conceptual

environmental law and scholarship. See Barton H. Thompson, Jr., *People or Prairie Chickens: The Uncertain Search for Optimal Biodiversity*, 51 STAN. L. REV. 1127, 1127-28 (1999).

219. S. Boehmer-Christiansen, *The Precautionary Principle in Germany — Enabling Government*, in INTERPRETING THE PRECAUTIONARY PRINCIPLE 34, 38 (Timothy O’Riordan & James Cameron eds., 1994) (emphasis added).

220. Cf. GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS 23 (1970) (“What we choose [in response to the problem of accidents], whether intentionally or by default, will reflect the economic and moral goals of our society.”); CALABRESI & BOBBIT, *supra* note 170, at 17 (noting that societies must inevitably choose who suffers and by how much and that “[i]n this way societies are defined”).

221. Sunstein & Vermeule, *Capital Punishment*, *supra* note 35, at 19.

222. I am grateful to Bill Eskridge for suggesting this phrase.

223. Adler & Posner, *supra* note 15, at 195.

problems raised by Gödel's Incompleteness Theorem,²²⁴ however, may haunt even those who defend CBA in this more pragmatic sense. The problem lies in the fact that the formal language of the cost-benefit framework is not only irreducibly incomplete; it also is capable of denying its own incompleteness.²²⁵ That is, even as CBA's moderate proponents depict the procedure as an aid to decisionmaking that is to be supplemented by other considerations, CBA implicitly and unavoidably condemns those other considerations as undesirable. Again, the tautological conclusion of the formalized welfarist framework is that subjectivity and fairness *necessarily* derogate from rationality and welfare. It is hard to see how such a framework can remain properly limited to its actual sphere of competency, as CBA's pragmatic defenders would have it, given that the framework offers the seductive possibility of translating all relevant variables into the language of optimization.

V. CONCLUSION

This Article has attempted to set out the underappreciated coherence and wisdom of the PP. Still, the problem remains that the PP by itself does not provide adequate substantive guidance as to how its various safety valves should be utilized. Nor does the principle tell us how to implement those safety valves in a manner that is consistent with the simultaneous demands of adaptive expertise and democratic legitimacy. Nor finally does the PP directly grapple with the profound intellectual and practical challenges of squaring a theory of intergenerational responsibility with liberal political theory.²²⁶ Development of such important issues will have to await further work.²²⁷ For now, it is enough to note that the task will require both humility regarding our powers of prediction and control, and courage regarding our ability to engage in a form of public decisionmaking that conceives of human societies and human generations as collective moral actors with their own agency, responsibility, and history.

The risks of oppression raised by such a collective vision are well known and justly feared. But the consequentialist-utilitarianism of CBA has a less-recognized oppressive force of its own: By completely rejecting the distinctiveness of moral agency, CBA leads to a radical erasure of boundaries not only between in-

224. See *supra* text accompanying notes 118-119.

225. See *supra* text accompanying notes 194-195.

226. See Kysar, *Sustainable Development*, *supra* note 41.

227. See KYSAR, *supra* note 31.

dividuals, but also between generations—a compressing of human history into a single moment of maximal net benefit, devoid of identities, relations, and responsibilities. As such, the optimization rubric invites an ethical counterpart to nanotechnology’s “gray goo” nightmare: a slippery universe of homogenized interests and influences in which the very distinctiveness of human identity and agency is slowly, but irretrievably erased. Put differently, the most basic normative message of the PP, the Hippocratic adage, and other precautionary maxims—the reminder above all else to *be moral*²²⁸—cannot be located within the optimization paradigm. To the contrary, the optimization paradigm works to render such a message unintelligible, for it erases the kinds of distinctions that enable us to identify moral agents to whom the reminder might be directed.

As this Article has argued, such a conception is incapable of long sustaining the notion that its results have compelling moral significance. Even complete acceptance of the causal optimality approach of CBA must depend on moral reasons for acceptance that find their source elsewhere than simply in a desire to optimize. Yet the political communities whose moral convictions supply this source hold no clear or secure place in the philosophy of optimization. Instead, the staunchly individualistic foundation of CBA denies political communities the capacity to collectively articulate their goals and ideals, a failing that seems especially problematic for policies impacting foreign nations, future generations, and other interest holders that are not already present in the optimization calculus. For such policies, a notion of collective agency provides the most analytically appropriate frame of evaluation, as it permits the political community to perceive itself as standing in relations of responsibility with, and historical connection to, those other political communities. Under CBA, on the other hand, those individuals whose lives are statistically, spatially, or temporally dispersed become subtly conscripted without their consent into a disembodied pursuit of utility-maximization. Indeed, under the optimization rubric, the “monetary equivalents” of their lives may be traded away for a few weeks’ extension of the golf season. No amount of theorizing can make the sacrificed individuals “better off” in the bargain.

228. See *supra* text accompanying notes 45-49.

**TALES OF THE TAMIAMI TRAIL:
IMPLEMENTING ADAPTIVE MANAGEMENT IN
EVERGLADES RESTORATION**

ALFRED R. LIGHT¹

I.	INTRODUCTION.....	59
II.	ADAPTIVE MANAGEMENT IN EVERGLADES RESTORATION IMPLEMENTATION.....	64
III.	CASE STUDIES: PROJECTS ALONG THE TAMIAMI TRAIL.....	69
	<i>A. Modified Water Deliveries to Everglades National Park and CSOP (“Mod Waters”).....</i>	69
	<i>B. Decompartmentalization (“Decomp”) Project.....</i>	81
	<i>C. C-111 and C-111 Spreader Canal Projects.....</i>	84
	<i>D. Picayune Strand and “Western” Tamiami Trail Culverts.....</i>	86
IV.	REFLECTIONS ON THE CASE STUDIES.....	90

I. INTRODUCTION

The Tamiami Trail (U.S. Hwy 41) connects Tampa and Miami. From Tampa, the highway moves southward along the west coast of Florida. Fort Myers and Naples lie to its west on the southwest coast of Florida, while to its east lie the Audubon Society’s Corkscrew Swamp Sanctuary, containing remnants of the swamp which used to command this Florida heartland, and Lake Trafford, undergoing a major dredging and restoration effort.² The Florida Panther National Wildlife Refuge lies to their east.³ From Naples, the Trail curves to the east, passing Rookery Bay National Estuarine Research Reserve and Collier Seminole State Park and then Ten Thousand Islands National Wildlife Refuge (to its south)

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2. See Audubon, Corkscrew Swamp Sanctuary, <http://www.corkscrew.audubon.org> (last visited Dec. 21, 2006); U.S. Army Corps of Eng’rs, Central and Southern Florida Ecosystem Restoration, Critical Project Letter Report (May 1998), <http://www.saj.usace.army.mil/projects/laketraff.htm>.

3. See U.S. Fish & Wildlife Service, Florida Panther National Wildlife Refuge, <http://www.fws.gov/floridapanther/> (last visited Dec. 21, 2006).

and Picayune Strand State Forest and Fakahatchee Strand State Preserve (to its north).⁴ As you move further eastward, the road cuts through the Big Cypress National Preserve and then skirts along the northern border of Everglades National Park next to the Miccosukee Indian Village.⁵ This east-west section of Tamiami Trail eventually becomes Southwest Eighth Street in Miami-Dade County, passing Florida International University and then ends as “Calle Ocho” in the Little Havana section of Miami.⁶

Originally the idea of James Franklin Jaudon, President of the Chevalier Corporation in Miami and Dade County’s tax assessor in 1915, the Tamiami Trail officially opened in 1928, requiring 13 years of labor, \$8 million, and 2.6 million sticks of dynamite.⁷ Barron Gift Collier, a streetcar advertising magnate with diverse interests in southwest Florida, actually bankrolled completion of the road, creating the Trail’s “dog leg” in the Trail at the point where he took over the work and for which the state legislature established a new county and named it after him.⁸ The National Park Service describes the construction of this portion of the Trail on the Big Cypress National Preserve website as follows:

The most impossible part of the Trail was the stretch from just below Carnestown to the Dade line. It took 150 workers to complete 1.25 miles per month. The final 45.5 miles took nearly four years to build. They drilled the limestone with a 30-ton drill car. Day and night for 28 months it drilled through solid rock. Bay City skimmer scoop machines unloaded sand

4. See Friends of Rookery Bay, Rookery Bay National Estuarine Research Reserve, <http://www.rookerybay.org> (last visited Dec. 21, 2006); Collier-Seminole State Park, <http://www.floridastateparks.org/collier-seminole/> (last visited Dec. 21, 2006); U.S. Fish & Wildlife Service, Ten Thousand Islands National Wildlife Refuge, <http://www.fws.gov/south-east/TenThousandIsland/> (last visited Dec. 21, 2006); Florida Department of Agriculture & Consumer Services, Division of Forestry, Picayune Strand State Forest, http://fl-dof.com/state_forests/picayune_strand.html (last visited Dec. 21, 2006); Fakahatchee Strand Preserve State Park, <http://www.floridastateparks.org/fakahatcheestrand/> (last visited Dec. 21, 2006).

5. National Park Service, Big Cypress, <http://www.nps.gov/bicy/> (last visited Dec. 21, 2006); National Park Service, Everglades National Park, <http://www.nps.gov/ever/> (last visited Dec. 21, 2006); Miccosukee Indian Village, <http://www.miccosukeeresort.com/mivillage.html> (last visited Dec. 21, 2006).

6. Tamiami Trail, Wikipedia, The Free Encyclopedia, http://en.wikipedia.org/wiki/Tamiami_Trail/ (last visited Dec. 21, 2006); Calle Ocho, http://miami.about.com/cs/maps/a/calle_ocho.htm (last visited Dec. 21, 2006). The South Florida Ecosystem Restoration Task Force has its staff located on the campus of Florida International University, at 11200 S.W. 8th Street, see <http://www.sfrestore.org/> (last visited Dec. 21, 2006).

7. *Id.* Jaudon’s company completed the portion of the road in Miami-Dade County before Collier became involved. See Gail Clement, Everglades Biographies, James Franklin Jaudon, <http://www.fiu.edu/~glades/reclaim/bios/jaudon.htm> (last visited Dec. 21, 2006).

8. *Id.*

and rock. They did the work of 50 men leveling the grade thrown up by the dredges. Dredges mounded up fill for road bed embankments. They used wooden tramways for transporting supplies. Caterpillar tractors pulled Austin Western scarifiers during road grading operations about 1927.⁹

The road bisecting this wilderness always has had its risks. In the twentieth century, road kills of wildlife were so prevalent that they sometimes made “the road slippery and the stench obnoxious.”¹⁰ President Truman dedicated Everglades National Park in 1947, an unusual national park based on its “spectacular plant and animal life” rather than “lofty peaks” or “mighty glaciers.”¹¹ However, the Tamiami Trail, and the water control structures associated with it, disrupts this ecosystem. The Everglades National Park describes the situation somewhat lyrically on its website:

Now, extensive canal and levee systems shunt off the life-giving bounty of the rain before it can reach the national park, which comprises only one-fifth of the historic Everglades. At times the water control structures at the park boundary are closed and no water nourishes the wood stork's habitat. Or, alternatively, water control structures are opened, and unnaturally pent-up, human-managed floodwaters inundate Everglades creatures' nests or eggs and disperse seasonal concentrations of the wading birds' prey.¹²

The Tamiami Trail transects the portion of the southern part of the Greater Everglades Ecosystem which the United States and Florida are now jointly trying to rehabilitate. Altogether, this comprises much of the mostly publicly-owned property called the

9. National Park Service, *The Tamiami Trail*, <http://www.nps.gov/bicy/Tamtral.htm> (last visited Dec. 21, 2006). A more detailed history of the Trail can be found on the Barron Collier museum website. Collier County Museums, *Tamiami Trail History and Photos*, <http://www.colliermuseum.com/history/tamiami.htm> (last visited Dec. 21, 2006).

10. THOMAS E. LODGE, *THE EVERGLADES HANDBOOK: UNDERSTANDING THE ECOSYSTEM* xxxiii (2d ed. 2005).

11. Harry S. Truman, Dedication of Everglades National Park (Dec. 6, 1957), *quoted in* Deborah Nordeen, *South Florida's Watery Wilderness Park Nears 50*, <http://www.nps.gov/ever/eco/nordeen.htm> (last visited Dec. 21, 2006); National Park Service, *A Park for the World: Everglades National Park*, <http://www.nps.gov/ever/presskit/heritage.htm> (last visited Dec. 21, 2006) (The Park is “an International Biosphere Reserve, a World Heritage Site and a Ramsar Wetland of International Importance . . .”).

12. National Park Service, *A Park in Danger: Everglades National Park*, <http://www.nps.gov/ever/eco/threats2.htm> (last visited Dec. 21, 2006).

Everglades Protection Area.¹³ Most of the rest of the original ecosystem, which is urbanizing or agricultural, must be managed carefully and intelligently if the Everglades Protection Area is to be rehabilitated to a more natural state.¹⁴ Projects near the Trail are critical to the success of the overall restoration plan. Their success, in turn, depends heavily on an ability to adapt them as projects to manage water to their north are built and change operations of the water management system.¹⁵

The United States and Florida have struggled with how to restore the Greater Everglades Ecosystem for several decades. The Comprehensive Everglades Restoration Plan (CERP) adopted by Congress in 2000 came after almost two decades of wrangling — beginning with Florida Governor Bob Graham’s “Save Our Everglades” program and continuing since to include substantial state and federal environmental initiatives, a lawsuit by the United States against the District, Governor Lawton Chiles’ high-profile “surrender” in this suit shortly after his election, numerous challenges to this “settlement” before state and federal agencies and judges, creation by interagency agreement of a South Florida Ecosystem Restoration Task Force and Working Group, a Statement of Principles among stakeholders staying several legal challenges, and a state Everglades Forever Act intended to embody and indeed to force compromise.¹⁶ In fact, there was some remarkable ecosystem restoration in other parts of the state well underway prior to CERP, such as the Everglades Construction Project creating stormwater treatment areas (STAs) for runoff from the Everglades Agricultural Area (EAA) and the Kissimmee River Restoration

13. The Everglades Protection Area usually refers to the portion of the Everglades for which the state is supposed to meet a numerical standard for phosphorus (roughly 10 ppb) and to set a timetable for performance under the consent decree settling the lawsuit between the United States and Florida. This area basically consists of the Water Conservation Areas and Everglades National Park. See LODGE, *supra* note 10, at 231. The area includes the Loxahatchee Wildlife Refuge, also known as Water Conservation Area 1, on the outskirts of West Palm Beach, which is not a focus of this Article. *Id.* at 253.

14. This area includes the Everglades Agricultural Area (EAA) to the south of Lake Okeechobee, the C-131 Basin to the west of the EAA, the Upper Chain of Lakes to the north of the Lake, and, of course, the Lake itself.

15. Discussion of these features of the water management system, such as Lake Okeechobee and the Everglades Agricultural Area is largely beyond the scope of this Article. Also omitted is a discussion of some features of the proposed Everglades restoration along Tamiami Trail still in the very early stages of development, such as the L-31N (L-30) Seepage Management Pilot, Official site of the Comprehensive Everglades Restoration Plan (CERP), http://www.evergladesplan.org/pm/projects/proj_36_l31n_seepage.cfm (last visited at Dec. 21, 2006), and Biscayne Bay Coastal Wetlands, Official site of CERP, http://www.evergladesplan.org/pm/projects/proj_28_biscayne_bay.cfm (last visited at Dec. 21, 2006).

16. This history of the restoration effort has been described in more detail elsewhere. See generally Alfred R. Light, *Ecosystem Management in the Everglades*, 14 NAT. RESOURCES & ENV'T 166 (2000).

north of Lake Okeechobee, some of which is now visibly complete.¹⁷ In 2004, the State of Florida accelerated Everglades restoration by deciding to finance and construct several CERP and related projects with borrowed funds in what has become known as the Acceler8 program.¹⁸

CERP is based on the Corps' and the District's April 1999 "Central and South Florida Comprehensive Review Study," variously called the Re-Study or the "Yellow Book."¹⁹ CERP requires an elaborate process for intergovernmental coordination and public participation.²⁰ Another integral component of the Re-Study was an adaptive management and monitoring plan.²¹ Accordingly, Congress approved funding for an Adaptive Assessment and Monitoring Program in the Water Resources Development Act of 2000 (WRDA 2000), which created CERP.²² Since 2000, the concept of Adaptive Management (AM) has evolved and is now defined in the CERP AM Strategy and AM Implementation Guidance Manual.²³ In Part II, we shall describe this CERP AM framework.¹

There is much to learn about how AM principles actually are applied in the Everglades through examining projects which were being designed and implemented during the period in which the CERP AM Program was being developed (2000-2006). This is the focus of Part III.²⁵ We detail the political and administrative history of several of the most critical of these projects along the

17. See S. Fla. Water Mgmt Dist., Everglades Construction Project, http://www.sfwmd.gov/org/erd/ecp/3_ecp.html (last visited Dec. 21, 2006); S. Fla. Water Mgmt Dist., Kissimmee River Restoration Project, <http://www.sfwmd.gov/org/erd/krr/index.html> (last visited Dec. 21, 2006).

18. See S. Fla. Water Mgmt Dist., Acceler8, <http://www.evergladesnow.org> (last visited Dec. 21, 2006); Alfred R. Light, *Spark Plugs of Policy Implementation: Intergovernmental Relations and Public Participation in Florida's Acceler8 Initiative to Speed Everglades Restoration*, 30 VT. L. REV. (forthcoming Summer 2006).

19. The Yellow Book can be ordered as a 2 CD set from the Comprehensive Everglades Plan website. Central and Southern Florida Project, Comprehensive Review Study, Final Integrated Feasibility Report and Programmatic Environmental Impact Statement (April 1999), <http://www.evergladesplan.org/pub/pubrequest/requestfrm.cfm> [hereinafter Yellow Book].

20. See generally Light, *supra* note 18.

21. Yellow Book, *supra* note 19, at § 9.5.3 (Monitoring Program Planning Guidelines); see also RECOVER, CERP Monitoring and Assessment Plan, Phase 1, § 2.0 (Development of the CERP Monitoring Plan and Adaptive Management Program), available at http://www.evergladesplan.org/pm/recover/recover_docs/map/MAP_2.0_Develop.pdf.

22. Water Resources Development Act of 2000, Pub. L. 106-541, § 601(b)(2)(C)(xi), 114 Stat. 2572, 2680-81 (2000) [hereinafter WRDA of 2000]; see WRDA 2000 Initial Projects: Adaptive Assessment and Monitoring Program, http://www.evergladesplan.org/wrda2000/ini_proj/adap_ass_mon.aspx (last visited Dec. 21, 2006).

23. U.S. Army Corps of Eng'rs, RECOVER, Comprehensive Everglades Restoration Plan Adaptive Management Strategy (April 2006), available at http://conference.ifas.ufl.edu/GEER2006/AM_Strategy.pdf [hereinafter AM Strategy].

24. See *infra* notes 32-61 and accompanying text.

25. See *infra* notes 62-188 and accompanying text.

Tamiami Trail. First is the Modified Water Deliveries to Everglades National Park Project (Mod Waters) authorized in 1989, but which was only commencing in 2006.²⁶ Collaborative adaptive management for this project included facilitation of a partial stakeholder consensus in 2006 in order to move forward.²⁷ Closely related to Mod Waters is the vision of a more natural hydrology by decompartmentalization of water conservation areas to the north and east of Everglades National Park. Because of major uncertainties associated with the project, Decompartmentalization (Decomp) has become a major test for the AM concept.²⁸ The re-engineering of the C-111 Canal into the C-111 spreader canal is vitally linked to outcomes in the Mod Waters and Decomp projects.²⁹ To the west of Mod Waters, various projects to construct or to clean-out existing culverts under Tamiami Trail are needed to provide information to make the massive Picayune Strand wetlands restoration a meaningful component of Everglades Restoration.³⁰ Innovative intergovernmental cooperation is piecing together the way forward through a variety of projects in this western portion of the Greater Everglades.

In Part IV, we reflect upon how the tales of these ecosystem restoration projects along the Tamiami Trail show the continuing difficulties for administrators trying to apply adaptive management and to achieve restoration in a complex interagency and intergovernmental environment.³¹ In the end, we see the continuing legacy of Barron Collier in shaping the Everglades along the Tamiami Trail.³²

II. ADAPTIVE MANAGEMENT IN EVERGLADES RESTORATION IMPLEMENTATION

Ecosystem management has many definitions. R. Edward Grumbine offers the following: "Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term."³³ The focus is on *goals* such as maintaining viable populations of native spe-

26. See *infra* notes 63-139 and accompanying text.

27. See *infra* notes 129-39 and accompanying text.

28. See *infra* notes 140-56 and accompanying text.

29. See *infra* notes 157-66 and accompanying text.

30. See *infra* notes 167-88 and accompanying text.

31. See *infra* notes 189-243 and accompanying text.

32. See *infra* notes 244-49 and accompanying text.

33. R. Edward Grumbine, *What is Ecosystem Management?*, 8 CONSERVATION BIOLOGY 27 (1994).

cies, maintaining evolutionary and ecological processes, and accommodating human use and occupancy within such constraints.³⁴ Adaptive management usually refers to the policy *tools* “intended to move decision making from a process of incremental trial and error to one of experimentation using continuous monitoring, assessment, and recalibration.”³⁵ The Comprehensive Everglades Restoration Plan Adaptive Management Strategy, released in April 2006, provides a detailed definition:

Adaptive management is a science- and performance-based approach to ecosystem management in situations where predicted outcomes have high level of uncertainty. Under such conditions, management anticipates actions to be taken as testable explanations, or propositions so the best course of action can be discerned through rigorous monitoring, integrative assessment, and synthesis. Adaptive management advances desired goals by reducing uncertainty, incorporating robustness into project design, and incorporating new information about ecosystem interactions and processes as our understanding of these relationships is augmented and refined. Overall system performance is enhanced as AM reconciles project-level actions within the context of ecosystem-level responses.³⁶

The CERP definition of AM reflects the special CERP context. The Yellow Book examined the hypothetical performance of 21 parts of the South Florida ecosystem, including Lake Okeechobee, the Caloosahatchee and the St. Lucie estuaries, each of the three water conservation areas, two freshwater physiographic regions in Everglades National Park, and Florida Bay.³⁷ The Plan was based on a selected alternative, Alternative D13R, relying significantly on various computer models. The South Florida Water Management Model, the River of Grass Evaluation Model (ROGEM), the Across Trophic Level System Simulation Model (ATLSS), and water quality models evaluated the consequences of various alternatives.

34. *Id.*

35. JOHN COPELAND NAGLE & J.B. RUHL, *THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT* 334 (2002). Key books on adaptive management include: C.S. HOLLING, ED., *ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT* (1978); KAI N. LEE, *COMPASS AND GYROSCOPE: INTEGRATING SCIENCE AND POLITICS FOR THE ENVIRONMENT* (1993); CARL WALTERS, *ADAPTIVE MANAGEMENT OF RENEWABLE RESOURCES* (1986).

36. AM Strategy, *supra* note 23, at 1.

37. LODGE, *supra* note 10, at 249.

The ATLSS model, for example, evaluated effects on endangered species such as the Cape Sable seaside sparrow and the snail kite.³⁸

Alternative D13R contained 49 operational and structural features, including above-ground reservoirs north of Lake Okeechobee, and in the Everglades Agricultural Area, a huge contribution of Aquifer Storage and Recovery wells around Lake Okeechobee, and Decpartmentalization of Water Conservation Area 3-A, 3-B, and Everglades National Park.³⁹ This final component, Component QQ6, is of particular interest here. The Plan contemplated filling in the Miami Canal in most of WCA-3, degrading the L-67B levee and installing overflow structures along the length of L-67A, filling in 7.5 miles of the south end of the L-67 canal (along the L-67A levee), from the Tamiami Trail northward, removing the L-28 levees on the west side of WCA-3, removing the L-29 levee (that forms the south end of WCA-3A and 3-B) and the S-12 gates that currently regulate flow from WCA—3A into Everglades National Park, and elevating the Tamiami Trail on a new levee (to replace the L-29) but provide a series of bridges to allow sheet flow into Everglades National Park.⁴⁰ The effectiveness of the Decpartmentalization effort depended heavily on the accuracy of the computer models.

WRDA 2000 required that the Corps establish a process to ensure that new information resulting from changed or unforeseen circumstances, new scientific or technical information, or information developed through AM be integrated into implementation of the Plan. The Senate Committee on Environment and Public Works described the expectation:

The Committee does not expect rigid adherence to the Plan as it was submitted to Congress. This result would be inconsistent with the adaptive management principles in the Plan. Restoration of the Everglades is the goal, not adherence to the modeling on which the April 1999 Plan was based. Instead the Committee expects that the agencies responsible for project implementation report formulation and Plan implementation will seek continuous improvement of the Plan based upon new information, improved modeling, new technology, and changed cir-

38. *Id.* at 249-50.

39. *Id.* at 250-52.

40. *Id.*

cumstances.⁴¹

The Corps' Programmatic Regulations, promulgated in 2003, directed the Corps and the South Florida Water Management District to develop the CERP AM Program.⁴² This program was to include a monitoring and assessment program to be developed by CERP's scientific advisory board Restoration, Coordination, and VERification (RECOVER), periodic technical assessments by RECOVER, periodic assessments of CERP performance, re-evaluation and updates to the Plan to be conducted by the Corps and the District, and a mechanism to modify the Plan through Comprehensive Plan Modification Reports.⁴³ Mimicking the Senate Report, the regulations defined AM for CERP as "the continuous process of seeking a better understanding of the natural system and human environment in the South Florida ecosystem, and seeking continuous refinement in and improvements to the Plan to respond to new information, new or updated modeling, information developed though the assessment principles contained in the plan; and future authorized changes to the Plan in order to ensure that the goals and purposes of the Plan are fulfilled."⁴⁴

As applied to CERP, the goal of AM is to support improved decision-making and Plan performance over time. The integration of its principles into CERP is envisioned as beneficial to four groups: (1) Managers/Decision Makers, (2) Project Teams, (3) Scientists/Technical Experts, and (4) Stakeholders.⁴⁵ For example, Managers may use AM to address uncertainty and build flexibility into the Plan.⁴⁶ Project Teams may use AM to elevate system-wide problems faced by a project to a team specifically designed to address them, the System Planning and Operations Team (SPOT).⁴⁷ Scientists are to use AM as a forum to dialogue with managers on the interpretation of scientific data and its application to evaluate Plan performance.⁴⁸ Stakeholders may use AM as an additional opportunity for public participation and to express "changing societal values."⁴⁹

The CERP AM Strategy contains four process diagrams, called "boxes," that illustrate its major components: (1) CERP

41. S. REP. NO. 106-362, at 41 (2000).

42. Adaptive Management Program, 33 C.F.R. § 385.31 (2006).

43. *Id.*

44. 33 C.F.R. § 385.3 (2006).

45. AM Strategy, *supra* note 23, at 1.

46. *Id.*

47. *Id.*

48. *Id.*

49. *Id.*

Planning, (2) Performance Assessment by RECOVER, (3) Management/Science Integration, and (4) CERP Updates by Corps and District Managers.⁵⁰ AM principles are applied in each “box.” For example, in CERP Planning, which occurs at both the system-wide and project-level, planning activities should anticipate uncertainty and build performance-based versatility and robustness into the design of the Plan and each project, or detect and correct errors after project construction and make adjustments as they arise to ensure restoration goals are achieved.⁵¹ In Performance Assessment, scientific and technical information generated from the implementation of the monitoring program is organized to provide a process for the scientific RECOVER team to assess CERP performance and system responses, and to produce system status reports describing and interpreting the responses.⁵² Box 3 is a critical phase of the AM process in which scientists and managers collaborate in the development of options for addressing the challenges and opportunities presented by new knowledge about, or unexpected events within, the Everglades ecosystem.⁵³ Box 4, the CERP Update Process, involves the decision to alter the CERP by adjusting project plans or operations, or altering the sequencing of projects.⁵⁴

Of particular note is the CERP AM Strategy’s treatment of public participation. The Strategy touts that “[t]wo fundamental components of AM are collaboration and conflict resolution”⁵⁵ and advocates “an approach that incorporates openness, transparency, and accountability.”⁵⁶ The document recognizes the need for “building collaborative working relationships through the use of incentives and trust building, and minimizing conflict with the inclusion of a dispute resolution process.”⁵⁷ Thus, especially in Boxes 3 and 4 of the AM framework, “managers, scientists, and stakeholders will be most involved in negotiating competing interests and considerations to determine the best path forward for improved CERP performance.”⁵⁸ Despite these high-sounding statements of principle supporting collaboration and partnership with the public, the AM Strategy appears to envision only a “review and comment” role and responsibility for stakeholders and the public in CERP’s proc-

50. *Id.* at 8.

51. *Id.* at 3.

52. *Id.* at 4.

53. *Id.* at 5.

54. *Id.* at 6.

55. AM Strategy, *supra* note 23, at 2.

56. *Id.*

57. *Id.*

58. *Id.* at 2.

esses.⁵⁹ The Strategy simply states that “[s]takeholders and the public have an opportunity to provide input and review planning and decision documents in each of the boxes of the AM Framework.”⁶⁰ The Strategy contains no discussion of any particular dispute resolution process involving stakeholders or the public;⁶¹ nor is there any discussion of the role of litigation or judicial review.⁶²

III. CASE STUDIES: PROJECTS ALONG THE TAMIAMI TRAIL

Restoration projects along the Tamiami Trail may provide insights critical to the overall success of the Everglades restoration effort. In this survey of case studies, we shall move from east to west, taking U.S. 41 out of Miami. As one moves west past FIU and the Florida Turnpike one approaches the Miccosukee Casino on the north side of the road past Krome Avenue and the eastern edge of Everglades National Park on the south.⁶³ This is the portion of Tamiami Trail associated with Captain James F. Jaudon and which today is the location of Mod Waters, Decomp, and C-111.

A. Modified Water Deliveries to Everglades National Park and CSOP (“Mod Waters”)

In 1970, Congress established a quota system of monthly water allocations, consistent with seasonal South Florida rainfall, to protect Everglades National Park under drought conditions.⁶⁴ The system required minimum deliveries to three key areas in the Park: Shark River Slough, Taylor Slough, and the C-111/Eastern

59. See Roles and Responsibilities in the AM Process, Stakeholders and the Public, in AM Strategy, *supra* note 23, at 7-8.

60. *Id.* at 6.

61. This is somewhat surprising in light of the experience developed over the past decade regarding the need for dispute resolution. For example, see the discussion of the CSOP Advisory Team *infra* notes 135-40 and accompanying text.

62. CERP managers are understandably skittish about discussing litigation in their documents. For example, the Miccosukee Tribe demanded that the comment “Litigation may prove to be time consuming, costly, and uncertain, and it may divert resources from restoration efforts . . .” be deleted from a 2004 progress report on CERP. See Alfred R. Light, *Of Square Pegs, Round Holes, and Recalcitrants Lying in the Weeds: Superfund’s Legal Lessons for Everglades Restoration*, 12 MO. ENVTL. L. & POLY REV. 91, 116 (2004-2005). On the role of judicial review, see *id.* at 116-23.

63. See Miccosukee Resort and Gaming Website, <http://www.miccosukee.com/map.html> (last visited Dec. 21, 2006).

64. A good description of the background and chronology of the project may be found on the website of the Collaborative Adaptive Management Network. *Case Study #3, Evolution of Water Deliveries to Everglades National Park*, <http://www.adaptivemanagement.net/EvolutionofWaterDeliveries.pdf>.

Panhandle area.⁶⁵ The volumes were geared to reflect minimum flow characteristics of the 1940s and 1950s. However, in January and February 1983, El Nino required undesirable releases to the Park. This led to congressional authorization of an experimental program, in which the Corps, the District, and the Park explored ways to restore historic flow patterns to the Park. A Letter of Agreement signed in July 1985 provided for an ongoing testing program.⁶⁶ This occurred concurrently with a set of agreements between the District and agricultural interests farming an area between the C-111 Canal and the L-31W levee, known as the Frog Pond, in settlement of a lawsuit.⁶⁷ The settlement guaranteed lower L-31W levels to increase groundwater drainage during the wet season.⁶⁸

On October 10, 1988, Interim United States Attorney Dexter Lehtinen filed a lawsuit on behalf of the United States to force Everglades restoration. The United States complained that water managed by the District had polluted the Everglades and “resulted in the destruction of lower forms of aquatic life essential to the preservation of the sensitive ecosystems in the [Everglades National] Park and [the Loxahatchee Wildlife] Refuge.”⁶⁹ Normally, in large-scale environmental cases, the United States is represented by attorneys from the Environment and Natural Resources Division of the Department of Justice in Washington, D.C. This was an unusual suit.⁷⁰ Reportedly, Lehtinen filed suit without going through approved channels.⁷¹ Former Governor Lawton Chiles famously decided to “surrender” in 1991.⁷² Administration of the consent decree continues even today. In 2005, Judge Moreno, ruling on a motion by the Miccosukee Tribe (whom Dexter Lehtinen now represents), found the state in violation of the consent decree.⁷³ The court ordered the special master to hold a hearing and

65. *Id.* at 1.

66. *Id.*

67. *Id.*; Garcia v. United States, No. 01-801-CIV-MOORE/O’SULLIVAN, 2002 U.S. Dist. LEXIS 27704 (S.D. Fla. May 8, 2002).

68. *Id.*

69. United States v. S. Fla. Water Mgmt. Dist., 28 F.3d 1563, 1568 (11th Cir. 1994).

70. See generally Alfred R. Light, *The Myth of Everglades Settlement*, 11 ST. THOMAS L. REV. 55 (1998).

71. Lisa Gibbs, *Knee-Deep in the Endless Muddy*, MIAMI REVIEW, June 14, 1991, at 13A, 17A (“The newly appointed acting U.S. attorney had told nobody of his plans in advance, Lehtinen says, not even his own bosses in the Justice Department. State water management district officials found out about the suit from reporters’ phone calls. . . . Roger J. Marzulla, then assistant attorney general [for Environment and Natural Resources], summoned him for what one lawyer calls a ‘walk to the woodshed’ on Nov. 7. . .”).

72. *Chiles Admits Everglades Polluted*, ST. PETERSBURG TIMES, May 21, 1991 at 5B (“‘I’m here with my sword,’ the governor said after the pretrial hearing. ‘I want to give the sword to someone. I want to surrender.’”).

73. United States v. S. Fla. Water Mgmt. Dist., 373 F. Supp. 2d 1338 (S.D. Fla.

recommend remedies, emphasizing the need for the parties to propose “*specific acts* to be performed and *specific dates* by when those acts must be completed.”⁷⁴

The Modified Water Deliveries Project (Mod Waters) emerged during the early stages of this litigation when Congress passed the Everglades National Park Protection and Expansion Act in 1989.⁷⁵ The basic idea of Mod Waters is that in order to rehydrate parched and overdrained parts of the original Shark River Slough in Everglades National Park, the L-67 levees would be breached to allow flows from the over-flooded Water Conservation Area 3-A to enter the water-deprived Water Conservation Area 3-B and then to continue through new passages under the Tamiami Trail into “Northeast Shark Slough,” south of the trail, a new area to be annexed to Everglades National Park under the Act.⁷⁶ Mod Waters primarily consists of three main components, all of which have proved controversial: flood mitigation for the 8 ½ Square Mile Area, raising a section of U.S. 41, and conveyance and seepage control features to pass and control water flows into the Park, which includes a Combined Structural and Operating Plan (CSOP).

The Act provided that “the Secretary of the Army, in consultation with the Secretary [of the Interior], is authorized and directed to construct modifications to the Central and Southern Florida (C&SF) Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the Park.”⁷⁷ To address potential problems with flooding of the residential 8 ½ Square Mile Area, the Act also specifically directed the Secretary of the Army “to construct a flood protection system for that portion of presently developed land within such area.”⁷⁸ Instead of authorizing a specific amount to be appropriated for each agency involved, unusually the Act simply authorized “such sums as may be necessary” to carry out Mod Waters.⁷⁹ This was unlike typical Corps projects in which the Corps submits specific plans, project designs, cost estimates, and schedules for managing work to the Congress in connection with a request for appropriations. It is also unlike some other federal programs in which the Corps enters into an interagency agreement to construct a project for which the other agency has

2005).

74. 373 F. Supp. 2d at 1347 (emphasis added).

75. Pub. L. 101-229, 103 Stat. 1946 (1989).

76. LODGE, *supra* note 10, at 248.

77. 16 U.S.C. § 410r-8(a)(1) (2006).

78. 16 U.S.C. § 410r-8(c) (2006).

79. 16 U.S.C. § 410r-6(f)(1) (2006).

principal responsibility. For example, the Corps designed and built many Superfund remedial projects after the U.S. EPA specified a remedial action.⁸⁰

Although the Corps of Engineers is responsible for constructing the modifications under the 1989 Act, the George H.W. Bush administration proposed and received appropriations for the project through the Department of the Interior, under which the National Park Service was the principal intended beneficiary of the project. Over the years, however, the Department of the Interior viewed its role as “consultative,” leaving with the Corps decision-making authority regarding implementation of the projects. The National Park Service, through its South Florida Natural Resources Center, took a lead role in working with the Corps on the modeling and analysis of various project designs and alternatives.⁸¹ The Park Service also collaborated with the Corps on technical and scientific issues concerning the 8 ½ Square Mile Area, which is not on Park property.⁸² The U.S. Fish & Wildlife Service, performing its responsibilities under the Fish and Wildlife Coordination Act and the Endangered Species Act, also participated in “consultations” with the Corps.⁸³

1. *The 8 ½ Square Mile Area*

The saga of the 8 ½ Square Mile Area demonstrates the complex intergovernmental relationships regarding Mod Waters. The Army Corps of Engineers finalized its original design for the 8 ½ Square Mile Area component in 1992. The proposed project included a pump station, a flood mitigation canal, and a levee around the residential area.⁸⁴ The National Park Service’s South Florida Natural Resources Center at Everglades National Park responded with a report, completed in 1994, “Restoration of Northeast Shark Slough and Rocky Glades.”⁸⁵ The report summarized the hydrologic impacts of the C&SF project that resulted in an increase in

80. See generally ALFRED R. LIGHT, CERCLA LAW & PROCEDURE § 3.2.7 (1991).

81. Memorandum from P. Lynn Scarlett, Deputy Secretary, Department of the Interior to Earl Devaney, Inspector General, Department of the Interior, Draft Audit Report, Modified Water Deliveries to Everglades National Park 5 (Feb. 6, 2006), reprinted in U.S. DEPARTMENT OF THE INTERIOR, OFFICE OF INSPECTOR GENERAL, REP. NO. C-IN-MOA-0006-2005, MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, AUDIT REPORT, app.3, at 30 (Mar. 2006) [hereinafter Scarlett Memo].

82. *Id.*

83. *Id.*

84. See U.S. Army Corps of Eng’rs, *Modified Water Deliveries to Everglades National Park: 8.5 Square Mile Area Flood Mitigation Project, Project Summary*, available at <http://www.saj.usace.army.mil/dp/mwdenp-c111/8-5SMA/docs/projSum.pdf>.

85. Scarlett Memo, *supra* note 81, at 9.

water levels in the western portions of the Shark River Slough while lowering water levels in the eastern portion, including the Rocky Glades, the 8 ½ Square Mile Area, and northern Taylor Slough. Later that same year, Congress amended the Everglades National Park and Expansion Act of 1989 to allow the Federal and State governments to partner financially to acquire additional lands in areas adjacent to the park, including the 8 ½ Square Mile Area, to assist in restoring the Northeast Shark River Slough and historic patterns of water flows from the Park to Florida Bay and to provide for a non-structural solution to the flood mitigation problems in the 8 ½ Square Mile Area.⁸⁶ The legislation, supported by the State of Florida, authorized that funds previously appropriated for modified water deliveries could be made available for this purpose.⁸⁷

At the state level, Governor Lawton Chiles formed a committee to study the 8 ½ Square Mile component of Mod Waters. The committee determined that the 1992 project design would not resolve land use conflicts and recommended instead a design called a “flow-way” buffer, which would require the acquisition of the western third of the 8½ Square Mile Area.⁸⁸ In 1998, the South Florida Water Management District voted unanimously to support the full acquisition of the 8 ½ Square Mile Area and asked that the Department of the Interior provide funding assistance.⁸⁹

Politics intervened. Jeb Bush was elected governor of Florida in 1998. He abolished Chiles’ Governor’s Commission for a Sustainable South Florida, and in short order appointed different persons to the Governing Board of the South Florida Water Management District.⁹⁰ The Governor replaced the District’s executive director.⁹¹ In 1999, the “new” District reversed its 1998 position on

86. 16 U.S.C. § 410r-8 (2006).

87. 16 U.S.C. § 410r-8(k) (2006).

88. Scarlett Memo, *supra* note 81, at 9.

89. *Id.*; Cyril T. Zaneski, *E. Glades Buyout Ordered Wetland Residents Protest Decision*, MIAMI HERALD, Nov. 13, 1998, at 1A.

90. *See Governor’s Commission for the Everglades*, MIAMI HERALD, Nov. 30, 1999, at 3B (effectively substituting new Commission for the Gov. Chiles’s Governor’s Commission for a Sustainable South Florida); Neil Santaniello, *Water District Re-Evaluation Buyout Plan*, SOUTH FLORIDA SUN-SENTINEL, June 23, 1999, at 1B (“With a new water-district board seated since November’s buyout vote — including six member majority appointed by Gov. Jeb Bush — the 8 ½ Area residents now can hope for a change in course.”).

91. *See* Neil Santaniello, *New Water Manager Sails a Steady Course*, SOUTH FLORIDA SUN-SENTINEL, June 26, 1999, at 3B (“Finch also said he aims to eliminate negative outlooks by his 1,894-employee agency, which he described later as ‘shell-shocked’ by recent changes. Among the changes: The firing of Poole by Gov. Jeb Bush’s board appointees over objections of board holdovers chosen by Gov. Lawton Chiles and departures of top agency attorneys.”); Cyril T. Zaneski, *Buyout Lawsuit Bogs Down Everglades Restoration Plan*, MIAMI HERALD, April 6, 1999, at 1B (“The board’s first move was to fire former Executive Director Sam Poole. Among the reasons that Collins cited for Poole’s dismissal was his

the full acquisition of the 8 ½ Square Mile Area and instead asked the Corps to undertake a NEPA review of all alternatives for this component of Mod Waters.⁹² The District asked that the Corps consider the alternative of acquiring lands for flood mitigation of the 8 ½ Square Mile Area.⁹³

Responding to this inquiry in 2000 (just as Congress was approving CERP), the Corps finalized a revised project design, Alternative 6D.⁹⁴ This design was very similar to the 1995 recommendation of the Chiles Committee, before Bush's "reorganization."⁹⁵ The District and the Department of the Interior approved the design, and Congress reappropriated \$30 million.⁹⁶ This, of course, did not end the controversy, as opponents by then were turning to litigation.

On February 23, 2001, some residents who were unwilling to sell their land in the 8 ½ Square Mile Area filed a case against the Corps. They asserted that the Corps did not have the authority under the Mod Waters authorization to implement a plan that did not protect the entire 8 ½ Square Mile Area from flooding.⁹⁷ On July 5, 2002, a district judge adopted an earlier ruling by a federal magistrate that restricted the Corps from veering from its original mandate to protect the entire community from flooding, and prevented the Corps from acquiring land in the 8 ½ Square Mile Area. The case was appealed to the Eleventh Circuit. Litigation thus had halted implementation of Alternative 6D in 2002.⁹⁸

Congress then intervened and resolved all legal issues associated with the litigation by including legislative language in the 2003 Consolidated Appropriations Act.⁹⁹ Harkening back to Le-

handling of the 8 ½ Square Mile issue.”).

92. Scarlett Memo, *supra* note 81, at 39; see Cyril T. Zaneski, *Water Board to Halt Home Buyout*, MIAMI HERALD, Aug. 12, 1999, at 3B (“The water district’s new governing board, with six of nine members appointed by Gov. Jeb Bush, rescinded the full buyout decision of last November to settle a lawsuit by the Miccosukee Tribe.”); Neil Santiello, *Environmentalists Warn of Fight*, SOUTH FLORIDA SUN-SENTINEL, Aug. 12, 1999 (“But that vote, decided by a board appointed by Gov. Lawton Chiles, was rescinded after a six-member majority seated by Gov. Jeb Bush took control this year and decided the earlier vote may not be legally defensible.”).

93. *Id.*

94. See U.S. Army Corps of Eng’rs, *Impact of Implementation of Recommended Plan Alternative 6D for the Comprehensive Everglades Restoration Plan*, http://www.usace.army.mil/civilworks/hot_topics/ht_2003/impact_of_imp.pdf (last visited Dec. 21, 2006).

95. Scarlett Memo, *supra* note 81, at 10.

96. *Id.*

97. See *Garcia v. United States*, No. 01-801-CIV-Moore, 2002 U.S. Dist. LEXIS 27705 (S.D. Fla. July 5, 2002); Pervase A. Sheikh, *Everglades Restoration: Modified Water Deliveries Project*, CRS Report for Congress RS21331, CRS-6 (Updated Aug. 23, 2005).

98. *Id.*

99. Sheikh, *supra* note 97, at CRS-6. The provision in the Consolidated Appropriations Resolution for FY2003 authorized the Corps to implement Alternative 6D as part of Mod Waters. Three conditions were specified: (1) the Corps may acquire residential property needed to carry out Alternative 6D if the owners were first offered comparable property

htinen's original Everglades suit, however, a provision in the FY2004 Interior Appropriations Act created another legal issue — prohibiting appropriations for Mod Waters if the Secretary of the Army, the Secretary of the Interior, the Administrator of the EPA, and the Attorney General indicate in a joint report (to be filed annually until December 31, 2006) that water entering the A.R.M. Loxahatchee National Wildlife Refuge and Everglades National Park does not meet state water quality standards, and if the House and Senate Committees on Appropriations respond in writing disapproving the further expenditure of funds.¹⁰⁰ Over this period of nine years, it is not surprising that land acquisition and construction costs increased substantially.¹⁰¹ Further appropriations for both the Corps and the Department of the Interior made in 2006 finally permitted the implementation of Alternative 6D to go forward, with \$25 million funded through the Department of the Interior and \$35 million through the Corps.¹⁰²

2. Tamiami Trail Component

A second component of the original Mod Waters was the raising of portions of U.S. 41, the Tamiami Trail, particularly the section where it crosses the L-31N canal.¹⁰³ The Corps' 1992 General Design Memorandum for Mod Waters, assumed that existing culverts under Tamiami Trail would be sufficient for increased flow under the road. Many challenged this assumption, including the National Park Service. The Corps subsequently prepared hydrological analyses that revealed that high water levels in the L-29 Canal would affect the road base of Tamiami Trail and overtop low areas.¹⁰⁴ This led to a 2003 General Reevaluation Report, ad-

in the 8 ½ Square Mile Area that would be provided flood protection; (2) the Corps could acquire land from willing sellers in the flood-protected portion of the 8 ½ Square Mile Area to carry out the first condition; and (3) the Corps and the District may carry out these provisions with funds provided under the Everglades National Protection and Expansion Act of 1989 and funds provided by the Department of the Interior for land acquisition in restoring the Everglades. *Id.*

100. See Sheikh, *supra* note 97, at CRS-2; Pervase Sheikh and Barbara Johnson, *Phosphorus Mitigation in the Everglades*, CRS Report for Congress RL2131 (Updated Jan. 13, 2004).

101. *Id.*

102. A provision in the Interior Appropriations Act for FY2006 (Pub. L. 109-54) cites the provisions in the FY2004 Interior Appropriations Act discussed at note 99 *supra* and accompanying text; see Minutes from the Joint Meeting of South Florida Ecosystem Restoration Task Force and Water resources Advisory Commission, Dec. 7, 2005, at 4, *available at* http://www.sfrestore.org/tf/minutes/2005_meetings/7-8dec05tfmtg/dec2005tfmtg.pdf.

103. See U.S. Army Corps of Eng'rs, Modified Water Deliveries to Everglades National Park and South Dade Canals (C-111) Projects, <http://www.saj.usace.army.mil/dp/mwdenpc111/index.htm> (last visited Dec. 21, 2006) [hereinafter USACOE, Modified Waters site].

104. See U.S. Army Corps of Eng'rs, Public Workshop on Sept. 15, 2005, Modified Water Deliveries to Everglades National Park - Tamiami Trail Modifications, slide 6, *available*

dressing only the Tamiami Trail. Subsequent analyses showed that the 1992 design would have drained the very areas of the Park that Mod Waters was supposed to restore.¹⁰⁵ The 2003 Report recommended a 3,000 foot bridge but did not recommend any further raising along a 10.7 mile length of road that was evaluated.¹⁰⁶ Concerns were raised, however, that the predicted water elevation would damage the road and reduce public safety.¹⁰⁷

In August 2005, the Corps issued a Revised General Re-evaluation Report that reassessed alternatives, particularly in light of escalating costs. By this time, environmentalists were advocating a very expensive but environmentally preferable bridging of the entire 10.7 mile length of the Project corridor, while the Miccosukee Tribe opposed any bridge at all, preferring that the existing culverts be cleaned.¹⁰⁸ In January 2006, the Corps adopted a middle-of-the-road plan which included: a two-mile bridge on the west, a one-mile bridge on the east, raising the road about two feet in the remainder of the project area, stormwater treatment of water to improve quality, and access ramps.¹⁰⁹ While much less costly than the ten-mile bridge, the project high water design of 9.7 feet, Florida DOT road criteria standards, and the proposed acquisition of many properties along the highway presented considerable controversy for implementation of this design.¹¹⁰

3. Combined Structural and Operating Plan

The other structural and planning components of Mod Waters have been just as controversial as the 8 ½ Square Mile Area and the Tamiami Trail bridges. As is apparent from the discussion above regarding the controversy of the potential effects of raising the road, scientific disagreements over the effect of water levels and hydrology have plagued the Project over the past two decades.

at <http://www.saj.usace.army.mil/dp/mwdenp-c111/tamiamiTrail/docs/tamiamiTrail/TTMwokshop.pdf> [hereinafter Tamiami Trail Modifications].

105. Scarlett Memo, *supra* note 81, at 5.

106. Tamiami Trail Modifications, *supra* note 104, at 7.

107. *Id.*

108. John Paul Woodley, Jr., Assistant Secretary of the Army, Record of Decision for Central and Southern Florida Project Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications 3 (Jan. 25, 2006), available at <http://www.saj.usace.army.mil/dp/mwdenp-c111/tamiamiTrail/docs/tamiamiTrail/ttrod060125.pdf>. The Miccosukee Tribe supported the congressional condition that Mod Waters be completed before Decomp should be started. They also viewed advocacy by other interest groups for the "skyway" as inconsistent with this view. A "skyway" in their view would delay Mod Waters. More fundamentally, they expressed concern that "the Water Conservation Areas [in which the Miccosukee Reservation lies] are given second class status" to the Park. See, Maria Dolores Espino, Chair of CSOP Advisory Team, Handout, *Tribe General Concern about CSOP*.

109. *Id.* at 1.

110. Tamiami Trail Modifications, *supra* note 104, at 12.

The National Park Service's mandate is to preserve the Park in "primitive natural conditions."¹¹¹ In its view, this should be promoted by allowing water to move more freely into the Park as it did before U.S. 41 was built. But the Fish & Wildlife Service has been concerned that if water flows are not adequately controlled, it could compromise species habit for such endangered animals as the cape sable seaside sparrow. As of 2006, the two Interior Department agencies were unable to agree on optimal water depths. The Fish & Wildlife Service argues that higher water depths proposed by the National Park Service may damage tree islands, but the Park Service disagrees with this assessment.¹¹²

The remaining cape sable seaside sparrows reside in colonies within Everglades National Park and the Big Cypress Preserve.¹¹³ This sparrow has sometimes been called the "Goldilocks bird" because of its requirement of very precise requirements — not too dry, not too wet.¹¹⁴ In 1983, in response to high rainfall events, Congress authorized the Corps, in collaboration with the District and the Park, to experiment with deviations from a Minimum Flows and Levels (MFL) that had been developed for Everglades National Park in 1979.¹¹⁵ The cape sable seaside sparrow was listed as an endangered species in 1967; after Hurricane Andrew in 1992, numbers dropped dramatically.¹¹⁶ During the 1990s, the Corps experimented with a number of changes to the operating plan for the Central and South Florida Project to avoid jeopardizing the sparrow. The Fish & Wildlife Service prepared a Biological Opinion indicating that the Plan was jeopardizing the sparrow. In September 1999, the Natural Resources Defense Council filed suit against the Corps.¹¹⁷ These activities led to an Interim Structural and Operational Plan (ISOP) in 1999.¹¹⁸ NRDC remained

111. 16 U.S.C. § 410c (2006).

112. U.S. DEPARTMENT OF THE INTERIOR, OFFICE OF THE INSPECTOR GENERAL, MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, AUDIT REPORT 8 (Mar. 2006) [hereinafter *OIG Report*].

113. Julie L. Lockwood, et al., *Life History of the Cape Sable Seaside Sparrow*, 109 WILSON BULL. 720 (1997), available at <http://elibrary.unm.edu/sora/Wilson/v109n04/p0720-p0731.pdf>; U.S. Fish & Wildlife Service, South Florida Multispecies Recovery Plan, Cape Sable Seaside Sparrow, available at <http://www.fws.gov/southeast/vbpdfs/species/birds/csss.pdf> (last visited Dec. 21, 2006).

114. Alfred R. Light, *The Myth of Everglades Settlement*, 11 ST. THOMAS L. REV. 55, 67 (1998).

115. *Case Study #3*, *supra* note 64, at 1.

116. U.S. Fish & Wildlife Service, Endangered and Threatened Species of the Southeastern United States (The Red Book), Cape Sable Seaside Sparrow (1995), available at <http://www.fws.gov/endangered/i/b/sab03.html>.

117. *Nat. Res. Def. Council v. U.S. Army Corps of Eng'rs*, No. 99-2899, 2001 U.S. Dist. LEXIS 21029 (S.D. Fla. 2001).

118. U.S. ARMY CORPS OF ENG'RS, INTERIM STRUCTURAL AND OPERATIONAL PLAN FOR HYDROLOGIC COMPLIANCE WITH THE CAPE SABLE SEASIDE SPARROW BIOLOGICAL OPINION

concerned, however, that the Corps would not follow the “Reasonable and Prudent Alternative” in the ISOP recommendations of the Fish & Wildlife Service. In 2001, however, a magistrate judge gave great weight to the hydrologic experience of the Corps and recommended that no preliminary injunction be issued.¹¹⁹ After the Corps formally adopted the ISOP, the NRDC moved for voluntary dismissal of its case as moot in 2002. This did not end litigation however. The Miccosukee Tribe had intervened in the NRDC suit, and after it was dismissed, the Tribe filed its own complaint alleging that the Environmental Impact Statement (“EIS”) for the Interim Operational Plan (“IOP”) was inadequate, in part because of impacts on the Everglades snail kite, another endangered species.¹²⁰ The NRDC then intervened in the Miccosukee suit, seeking to maintain the benefits of IOP for the western population of sparrows while seeking changes to benefit the eastern population.¹²¹ In 2002, the Fish & Wildlife Service issued a revised Biological Opinion which concluded that releases through the S-12 structures under Tamiami Trail were adversely affecting the sparrows and that changes that were instituted to benefit the sparrows were adversely affecting snail kites.¹²² In 2005, the Miccosukee Tribe challenged this amended 2002 Biological Opinion because it did not have an EIS.¹²³

Without clear decision-making authority, however, the two principal Interior Department agencies continue to disagree among themselves on important project details. For example, the Fish & Wildlife Service and the Park Service disagree with each other about the effect of water flows into the Park on species habitat and Park restoration and about optimal water depths for Project operations.¹²⁴ The Interior Department’s Inspector General concluded in March 2006 that “[c]onflicts surrounding this issue have contributed to the need for multiple re-designs of Project features that determine how water will flow into the Park.”¹²⁵

FOR THE YEAR 2000, (Dec. 8, 2006), available at <http://www.saj.usace.army.mil/h2o/lib/documents/hw-isop/csss2000m.pdf>.

119. Nat. Res. Def. Council v. U.S. Army Corps of Eng’rs, No. 99-2899, 2001 U.S. Dist. LEXIS 21029 (S.D. Fla. 2001).

120. Miccosukee Tribe v. United States, 420 F. Supp. 2d 1324 (S.D. Fla. 2006).

121. Richard Hamann, *Hot Topics in the Old Swamp: The Role of Public Interest Litigation in Everglades Restoration*, in ENVIRONMENTAL AND LAND USE LAW SECTION ENVIRONMENTAL AND LAND USE LAW: HOT TOPICS, PROJECTS, AND CASES 4.8, 4.14 (2006).

122. U.S. Fish & Wildlife Service, Final Amended Biological Opinion for the U.S. Army Corp of Eng’rs Interm Operational Plan (IOP) for Protection of the Cape Sable Seaside Sparrow (Mar. 28, 2002), available at http://www.fws.gov/verobeach/species/birds/csss/iop-bo/csss_iop_bo_fin.pdf.

123. Miccosukee Tribes v. United States, 430 F. Supp. 2d 1328 (S.D. Fla. 2006).

124. OIG Report, *supra* note 112, at 8.

125. *Id.*

In 2003, these interagency and stakeholder conflicts spurred the South Florida Ecosystem Restoration Task Force to create an Advisory Team tasked with developing a consensus so that restoration projects could go forward. The Combined Structural and Operation Plan (CSOP) is the combined operating schedule for Mod Waters and the closely related C-111 Project. The CSOP Advisory Team consisted of voting members representing stakeholder interests of residents, recreation, the environment, and agriculture; and non-voting members representing federal, state, local, and tribal entities.

The CSOP facilitation process became a critical path for the overall Everglades restoration effort for several reasons. First, partly as a result of the way the 1988 Everglades lawsuit envisioned restoration (*i.e.* the timely seasonal provision of adequate amounts and quality of water into the Park and the Refuge), “success” required adjustment of flows into these federal properties administered by agencies of the Department of the Interior. This divided the federal interest between the Interior on one side and the Corps, responsible along with the District for management of the water, on the other. The Corps considered its Mod Waters Project to be closely aligned with its project to improve the C-111 canal to the east, so much so that it linked the two projects both in funding and in decision-making.¹²⁶ Several of the “critical projects” conditionally authorized by the Water Resources Development Act of 1996 are directed to the restoration of flows to the Park and the Big Cypress National Preserve, such as the construction of 77 culverts along the Tamiami Trail at 30 different locations, the Southern Golden Gate Estates hydrologic restoration in Collier County, and the L-31E Flow Redistribution Project to reestablish freshwater flows into Biscayne Bay.¹²⁷ CERP’s components needing congressional approval of the design propose further modifications to the C-111 canal to restore “sheet flow,” *i.e.* the C-111 Spreader Canal, the Decompartmentalization of Water Conservation Areas 3A and 3B, the Picayune Strand (formerly Southern Golden Gate Estates), and related projects.¹²⁸ CSOP sets the interim conditions

126. See USACOE, Modified Water site, *supra* note 103.

127. See U.S. Army Corps of Eng’rs, *Critical Projects*, <http://www.saj.usace.army.mil/projects/index.html> (last visited Dec. 21, 2006).

128. See Official site of CERP, *CERP Projects*, http://www.evergladesplan.org/pm/projects/project_list.aspx (last visited Dec. 21, 2006) (listing projects that include C-111 Spreader Canal, Picayune Strand (formerly Southern Golden Glades Estates) Hydrologic Restoration, Water Conservation Area 3A Decompartmentalization & Sheet Flow Enhance - Part 1, Water Conservation Area 3A Decompartmentalization. & Sheet Flow Enhance - Part 2, Water Conservation Area 2B Flows to Everglades National Park (ENP), Restoration of Pineland & Tropical Hardwood Hammocks in C-111 Basin, Hydrological Restoration, and Everglades National Park Seepage Management).

for operation of the current structures while these longer term projects are to be designed and constructed over the next decade. Litigation or other “stakeholder” challenges over CSOP had the potential to stall most, or all, of these major components of the restoration.

The CSOP Advisory Team, however, took a while to evolve. In January 2001, at the suggestion of the Council of Environmental Quality (CEQ), the Corps contacted the U.S. Institute for Environmental Conflict Resolution in Phoenix, Arizona, to help facilitate problems associated with Mod Waters.¹²⁹ The four agencies involved (the Corps, Everglades National Park, South Florida Water Management District, and U.S. Fish & Wildlife Service) decided that they would consider a collaborative facilitative process for the Combined Structural and Operational Plan (CSOP) contingent on their resolving their differences over the Interim Operational Plan (IOP).¹³⁰ Before proceeding with such an innovative approach, however, they commissioned the Institute to conduct an assessment “to find out how stakeholders would react to an invitation to collaborate with them on CSOP.”¹³¹ The Institute was also to “help guide the design of an appropriate multi-stakeholder EIS process.”¹³² After conducting interviews with stakeholders, the Institute identified substantive issues needing resolution, and compiled a list of stakeholder suggestions for effective collaboration.¹³³ The Institute then offered a number multi-stakeholder CSOP Process Design Options.¹³⁴ The Corps ultimately decided on a version of the Institute’s Alternative #6, Non-FACA Advisory Body Established by the Task Force’s Working Group.¹³⁵ It appointed the Florida Conflict Resolution Consortium at Florida State University (FCRC), and its Director Bob Jones, to facilitate the group.¹³⁶ FCRC is a Consortium organized under Florida law for “alternative dispute resolution consensus building.”¹³⁷ FCRC

129. U.S. INSTITUTE FOR ENVIRONMENTAL CONFLICT RESOLUTION, ASSESSMENT OF OPPORTUNITIES FOR MULTI-STAKEHOLDER COLLABORATION ON THE ENVIRONMENTAL IMPACT STATEMENT PROCESS FOR THE COMBINED STRUCTURAL AND OPERATIONAL PLAN FOR MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK AND C-111 CANAL PROJECTS 12 (Nov. 12, 2002), http://www.ecr.gov/pdf/everglades_final_report.pdf.

130. *Id.*

131. *Id.*

132. *Id.* at 13.

133. *Id.* at 22-26.

134. *Id.* at 36-48.

135. *See id.* at 47; South Florida Ecosystem Restoration Task Force, Combined Structural and Operating Plan Advisory Team Charter (Dec. 1, 2003), http://www.sfrestore.org/issueteams/csop_advisory_team/CSOP_CHARTER.pdf [hereinafter Charter].

136. *See* CSOP - The First Step in Restoring the Everglades, FCRC LEADERSHIP LETTERS 6 (Mar. 2005), http://consensus.fsu.edu/LeADRship_Letters/LLMay06.pdf. Chris Pederson with FCRC was also intimately involved in the facilitation effort.

137. Fla. Stat. § 1004.59 (2006).

facilitated 23 meetings of the CSOP Advisory Team between December 2003 and April 2006.¹³⁸ Through facilitation and with close cooperation and modeling support from the Corps and the District, the Advisory Team finally adopted a set of recommendations, mostly consensus recommendations.¹³⁹ In May 2006, it submitted the recommendations on a tentatively selected plan (TSP) to the Task Force and, through it, to the Corps.¹⁴⁰

B. Decpartmentalization (“Decomp”) Project

Decpartmentalization is “the heart of Everglades restoration.”¹⁴¹ In the initial authorization, Part 1 of the Project was authorized to provide for immediate opportunities to enhance sheetflow within WCA-3, and between WCA-3 and Everglades National Park to its south. Conceptual design features in the Yellow Book included portions of the Miami Canal and increasing conveyance capacity of other canals to compensate for the loss of the Miami Canal, a principal source of drinking water for the City of Miami. It included modifications to the eastern portion of Tamiami Trail and the installation of bridges between the L-31N levee and the L-67 levees. Part 2 later envisioned further modifications of levees and canals to enhance sheetflow.¹⁴² The hydrologic needs and ecological impacts associated with the Decpartmentalization Project are envisioned to influence systems as far away as Lake Okeechobee and Florida Bay.¹⁴³ The 2002 Project Management Plan for Decomp noted the linkage between its project design and Mod Waters. “The recommended plan for Modified Water Deliveries Project will partially determine the starting point for additional plan formulation for this project and will be considered the baseline for evaluating benefits of the Decomp Project (the future without project condition).”¹⁴⁴

WRDA 2000 identified several features of this project for a “conditional authorization.”¹⁴⁵ Tamiami bridges, filling of the Mi-

138. *See supra* note 136, at 6.

139. CSOP Advisory Team, Tentatively Selected Plan Consensus Recommendations (May 1, 2006), http://www.sfrestore.org/issueteams/csop_advisory_team/documents/tf_recommendations_to_army_tsp.pdf. (as submitted by South Florida Ecosystem Restoration Task Force to Hon. John Paul Woodley, Assistant Secretary of the Army, May 18, 2006).

140. *Id.*

141. CERP Project Management Plan, WCA-3A Decpartmentalization & Sheet Flow Enhancement Project - Part 1, 13 (April 2002), http://www.evergladesplan.org/pm/pmp/pmp_docs/pmp_12_wca/decomp_main_apr_2002.pdf [hereinafter *Decomp PMP*].

142. *Id.*

143. *Id.* at 14.

144. *Id.* at 24.

145. *See* Alfred R. Light, *Risk Communication to Enhance Sustainability*, 1 INT’L J. ENVTL, CULTURAL, ECON., & SOCIAL SUSTAINABILITY 95, 99 (2005/2006) (“But conditional

ami Canal, and North New River improvements were authorized, subject to the Corps' subsequent submission of a Project Implementation Report (PIR) to be approved by "the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Environment and Public Works of the Senate."¹⁴⁶ WRDA 2000 expressly forbade appropriations for the projects in the absence of the approval of these two committees.¹⁴⁷ Acknowledging the link between the projects, Congress also expressly conditioned delayed appropriations "until the completion of the project to improve water deliveries to Everglades National Park"¹⁴⁸

Like Mod Waters, the Decomp "heart of Everglades restoration" comes at the geographic intersection of the three CERP goals: environmental restoration, water supply, and flood control. Considerable scientific controversy and uncertainty exists over hypotheses related to ecological function and on the most effective Decomp implementation strategy. Some hypothesize that strategies which foster point source conveyance of water, in deference to sheetflow, will be a more cost effective way to decompartmentalize with minimal risk to developed areas impinging along the borders of the Greater Everglades. Others see the remaining tree islands in the area as a vital resource, in deference to restoring slough habitats, and negatively impacted if historic hydroperiods return. Others see a need to keep canals open to recreational boating and fishing, in contrast to others that view open canals as sediment traps or breeding grounds for exotic fishes.¹⁴⁹ Because of this great variation in perspectives and hypotheses regarding the ecological effects of decompartmentalization approaches, the Decomp Project became the first major project under CERP to proceed under RECOVER's adaptive management strategy rather than the Corps' traditional project design approaches.¹⁵⁰ The Decompartmentali-

authorization' provisions such as that contained in WRDA 2000 violates established Supreme Court precedent regarding the separation of powers between the Congress and the executive. In other words, the condition cannot be enforced (a committee cannot 'veto' the prior Congress's authorization of the project) under the "legislative veto" precedents of the Supreme Court. To invalidate the prior Congress's authorization of the projects, each entire House of the Congress must approve the invalidation, and the invalidation must be presented to the President as with any ordinary legislation.").

146. WRDA of 2000, § 601(d)(i).

147. *Id.* at § 601(b)(2)(D)(iii).

148. *Id.* at § 601(b)(2)(D)(iv).

149. See Fred H. Sklar et al., *CERP Adaptive Management Application to the Decompartmentalization (Decomp) Project*, in 2006 GREATER EVERGLADES ECOSYSTEM RESTORATION CONFERENCE, PROGRAM & ABSTRACTS 209 (June 5-9, 2006), <http://www.conference.ifas.ufl.edu/geer2006/abstracts.pdf>.

150. See John Ogden et al., Using Adaptive Management to Meet the Challenges of Decompartmentalization: Decomp Adaptive Management Plan (DAMP) slide 2 (April 6, 2006) https://my.sfwmd.gov/pls/portal/docs/PAGE/PG_GRP_SFWMW_WRAC/PORTLET_W

zation Adaptive Management Plan (DAMP) was conceived as a means to find the best method for balancing the restoration, water supply, and flood control goals by combining data mining, historical analysis, physical models, and evaluation tools.¹⁵¹ Decomp's scientific uncertainties requiring exploration include the ecological effects of levee modification, effects of partial versus complete backfilling of canals, water depth and hydroperiod tolerance of tree islands, quantification of the benefits of sheetflow, assessment of seepage, and the calibration of hydrological models.¹⁵²

To address these uncertainties, WCA-3B was selected as the site of the physical model because its orientation, hydrology, and ecological history addressed the broadest range of questions with the greatest amount of scientific rigor. As the District described the project at the 2006 Greater Everglades Ecosystem Restoration Conference, "[t]he DAMP design will be a hybrid of a repeated measure evaluation of six 3000 ft gaps in the L-67C level in WCA-3 combined with a BACI evaluation of a 12,000 foot flowway."¹⁵³ John Ogden reported in April 2006 that "[t]he present design, which is called 'Prius v2' after the hybrid automobile, also attempts to incorporate 'stakeholder concerns' by 'restricting [the] backfilling of canals to the L-67C.'"¹⁵⁴ This means that the project was limited to continue accommodating the desires of recreational bass fishermen who use these canals to fish. Interestingly, bass fishing is an "advantage" of the "altered state" of this portion of the Everglades, which did not exist prior to twentieth century alterations to the ecology of the area. The project was also designed to allow commencement in the 2007 timeframe before the completion of CSOP features.¹⁵⁵ The project permits manipulation through hydrologic pulsing by the CSOP structures, in order to assess the cause while monitoring the effects of the project.¹⁵⁶ The project envisions five years of using the physical model (2007-2011) at a total cost of \$10.3 million in order to support a phased development and implementation of the project implementation report (PIR) for Decomp.¹⁵⁷

RAC_REPORTSDOCS/TAB772049/40606_OGDEN.PPT#2.

151. *Id.* at 3.

152. *Id.* at 4.

153. Sklar, *supra* note 149, at 209.

154. Ogden, *supra* note 150, at slide 9.

155. *Id.* at 12.

156. *Id.* at 14.

157. *Id.* at 19.

C. C-111 and C-111 Spreader Canal Projects

The C-111 and C-111 Spreader Canal projects are located in the extreme southeastern portion of Florida, adjacent to Everglades National Park on its east. C-111 is part of the C&SF flood control system for agricultural lands in South Miami-Dade and provides for the discharge of floodwaters into Taylor Slough in Everglades National Park. It serves a basin of approximately 100 square miles to the west and south of Homestead. Because of the extreme permeability of the Biscayne Aquifer in this area, “the project canals have a direct impact on water levels in adjacent areas.”¹⁵⁸ Thus, the success of other projects such as Decomp depends, in part, on seepage management and the routing, volume, and timing of water supply in the C-111 basin.¹⁵⁹

Although C-111 has served its flood control purpose admirably, it has presented a number of environmental concerns, including large-scale releases of freshwater to Manatee Bay when storm conditions necessitate flow through the S-197 structure; shortened hydroperiods in the marshes adjacent to C-111 because of overdrainage induced by the canal; prolonged hydroperiods in marshes impounded by levees on the north side of the canal; disruption and redirection of the natural sheet flow over the marsh; and declining fish catches and productivity in northeastern Florida Bay and Barnes Sound that may be associated with the altered freshwater deliveries.¹⁶⁰ The Mod Waters Project thus also contains some modifications to the C-111 canal designed to help the effectiveness of, and experiment with, various water delivery methods for the overall Mod Waters Project.¹⁶¹

CERP contains a proposal to reroute flows from the C-111 called the C-111 Spreader Canal Project, one of the ten initial CERP projects conditionally authorized under WRDA 2000.¹⁶² The Corps approved a Project Management Plan (PMP) for this Project in April 2002.¹⁶³ But the Project Implementation Report (PIR), which must be approved by two congressional committees, is not expected until September 2007.¹⁶⁴ As envisioned in the PMP, the overall goal of the project is the ecological restoration of the South-

158. Decomp PMP, *supra* note 141, at 31.

159. *Id.*

160. Brown and Caldwell, Draft Basis of Design Report for the C-111 Spreader Canal Project ES-1 (May 8, 2006), https://my.sfwmd.gov/portal/page?_pageid=54,2146098&_dad=portal&_schema=PORTAL [hereinafter C-111 BODR].

161. USACOE, Modified Waters Site, *supra* note 103.

162. WRDA of 2000 § 601(c).

163. Official Website of CERP, C-111 Spreader Canal Project Summary, http://www.evergladesplan.org/pm/pmp/pmp_docs/pmp_29_c111/pmp_29_summary.pdf.

164. C-111 BODR, *supra* note 160, at ES-1.

ern Glades and Model Lands in extreme southeast Florida, including downstream estuaries, by improving the timing, distribution, quantity, and quality of water deliveries.

In late 2004, the District selected the C-111 Spreader Canal as one of the projects to be expedited with state funding under the Acceler8 program.¹⁶⁵ Working with the Project Delivery Team at the Corps, the District's project managers and its contractor, Brown and Caldwell, decided to divide the C-111 Spreader Canal Project into two phases: Phase 1, to be built under the Acceler8 program, and Phase 2, to be built by the Corps with CERP funding after the PIR was submitted to Congress and funds were received. By folding only Phase 1 into the state program, the District limited its proposed costs to about \$41 million.

The District's Phase 1, approved during the summer of 2006, includes construction of a pump station, construction of a conveyance canal from the C-111 canal to U.S. Highway 1, construction of a spreader canal from U.S. 1 to the L-31E canal, construction of culverts under Card Sound Road, coordination with the Florida Department of Transportation for construction of a bridge where the canal crosses U.S. 1 and installation of culverts under U.S. 1 south of the canal crossing, and enhancement of Ludlum Slough to a wide, shallow flow-way to improve water quality. This would leave for the Corp Phase 2 Project possible construction of a Stormwater Treatment Area and Reservoir in the Frog Pond area, construction of a spreader canal from C-111 canal to U.S. 1, and filling in or plugging of the southern reach of the C-111 canal below the spreader canal to the S-197 structure, and removal of the S-18C and S-197 structures. The District's contractor recommended a particular design of the spreader canal (Alternative 5) because it left the smallest footprint of the alternatives considered, simplified permitting activities by limiting impacts to Florida Power & Light's mitigation wetlands east of U.S. 1, and allowed flexibility for future extension of the canal further to the east. Brown and Caldwell stated that "[p]erhaps most important[] . . . is the fact that Design Alternative 5 is most consistent with the PDT's current planning for a Phase 1 Project."¹⁶⁶ The June 2006 Basis of Design Report contemplated commencement of construction for the Project by November 2007.¹⁶⁷

165. *Id.*

166. *Id.* at ES-5.

167. *Id.* at ES-7.

D. Picayune Strand and "Western" Tamiami Trail Culverts

Everglades Restoration tales of the Tamiami Trail do not end with Mod Waters, Decomp and the C-111 Projects in the eastern portion of the Everglades affecting Everglades National Park. Consider also the projects along the southwestern portion of the Trail built by Bernard Collier, where there are other public lands of interest in addition to Everglades National Park. As one drives west along U.S. 41, the road curves north from Everglades National Park and cuts into the Big Cypress National Preserve. Past Big Cypress, the Florida Panther National Wildlife Refuge lies north of the highway and Faxahatchee Strand State Preserve lies to the south. Along the Trail, west of Everglades National Park, lies Ten Thousand Islands National Wildlife Refuge, Collier Seminole State Park, and Rookery Bay National Estuarine Research Reserve. In the middle of all these public lands lies the Picayune Strand State Forest, and the newly acquired parcel, known as "Picayune Strand" or, formerly, "Southern Golden Gate Estates."

The Southern Golden Gate Estates (Picayune Strand), 85 square miles in western Collier County, was drained in the early 1960s with the intention of extensive residential development.¹⁶⁸ Here, the Gulf America Corporation built 48 miles of canals and 290 miles of shell-rock roads.¹⁶⁹ These 85 square miles fall in the middle of, and are the "missing piece of the puzzle" for, a huge contiguous span of public lands in the western Everglades.¹⁷⁰ Before the planned residential development failed, roads and four large canals had been constructed. This overdrained the area resulting in a reduction of aquifer recharge (the water table dropped several feet), increased freshwater load discharges to estuaries to the south damaging oyster beds and mangrove forests, invasion of upland vegetation such as cabbage palms, loss of ecological connectivity and associated habitat, and increased frequency of forest

168. See U.S. ARMY CORPS OF ENG'RS, CERP, PICAYUNE STRAND RESTORATION, FINAL INTEGRATED PROJECT IMPLEMENTATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT 1-1 (Sept. 2004), http://www.evergladesplan.org/pm/projects/docs_30_sgge_pir_final.aspx [hereinafter PICAYUNE STRAND PIR].

169. Janet Starnes, *Overview of South Florida Water Management District CERP Projects Under Construction in Southwest Florida*, in 2006 GREATER EVERGLADES ECOSYSTEM RESTORATION CONFERENCE, *supra* note 149, at 217.

170. See PICAYUNE STRAND PIR, *supra* note 168, at Fig. 1-1 (Regional Connectivity Puzzle Map); S. Fla. Water Mgmt. Dist., Water Resources Advisory Committee, Picayune Strand Restoration Project Pump Stations Preliminary Design, slide 4 (Mar. 16, 2006), <http://www.evergladesnow.org> (follow "Projects" hyperlink; then follow "Picayune Strand (SGGE)" hyperlink; then follow "Picayune Strand Restoration: WRAC Issues Workshop Presentation"). Curiously, the Corps refers to the non-public area to the northwest of the Project as "urban development" while the State portrays the same area as "rural development." *Id.*

fires.¹⁷¹ Runoff that once flowed in a broad, shallow sheet to the coastal estuary was funneled into the Faka Union Canal system.¹⁷²

Florida had almost completed its purchase of the private lands which comprised the Southern Golden Gate Estate in late 2004 when the Governor announced the state's Acceler8 program.¹⁷³ In describing how Acceler8 would operate, state officials, in early 2005, looked to the state's project to fill the northern seven miles of the Prairie Canal, the eastern most of four canals in the Southern Golden Gate Estates as a guiding precedent. At that time, the Corps had already finalized a PIR for the full project.¹⁷⁴ For the Prairie Canal, federal officials literally faxed approvals of the project to the District on the date the project was to break ground.¹⁷⁵ The "Prairie Canal" project had been part of each of the alternatives the Corps had developed for the Picayune Strand PIR, so that an early "breakout" of the construction of this portion of the project with state funds became plausible.¹⁷⁶

The Corps' Chief of Engineers did not approve the Picayune Strand PIR until September 15, 2005, almost a year after the final

171. See PARSONS FOR S. FLA. WATER MGMT. DIST., PICAYUNE STRAND RESTORATION PROJECT, PRELIMINARY DESIGN REPORT-PUMP STATIONS, ES-1 (Mar. 2006), <http://www.evergladesnow.org> (follow "Projects" hyperlink; then follow "Picayune Strand (SGGE)" hyperlink; then follow "Final Preliminary Design Report - Project Pump Stations" hyperlink).

172. Starnes, *supra* note 169.

173. See Press Release, Florida Department of Environmental Protection, *Governor Bush Accelerates Restoration of America's Everglades* (Oct. 14, 2004), http://www.dep.state.fl.us/secretary/news/2004/oct/1014_01.htm; Jill Barton, *Everglades holdout accepts offer*, HOUSTON CHRONICLE, May 1, 2005, at A15; Jill Barton, *Holdout Will Sell Home in Swamp in Way of Everglades Restoration*, S. FLA. SUN-SENTINEL, Apr. 14, 2005, at 5B; Nicholas Spangler, *When \$4 Million feels like a Rip-off*, MIAMI HERALD, Feb. 3, 2006, at A1, (The most difficult purchase for the state was the 160 acre parcel of Jesse James Hardy, who received \$4.18 million for land he'd paid \$60,000 for in 1976); Eric Staats, *Miccosukees forced to give up land to Glades Restoration*, NAPLES NEWS, May 27, 2005, available at <http://www.uiso.org/content/view/310/52/> (The state completed its acquisition of the project lands, which started in 1983, in 2005 with its purchase of a Miccosukee parcel); Only a few newspaper reporters mentioned Hardy's unpermitted limestone mining operation. See Kelley Benham, *Standing his Ground*, ST. PETE. TIMES, Mar. 1, 2005, at 1E ("He supports his family and pays his lawyers with a sizable limestone mining operation. A couple of hundred trucks run on and off his land every day, hauling \$18 profit each.").

174. See Official Website of CERP, Picayune Strand (Southern Golden Gate Estates) Hydrologic Restoration, http://www.evergladesplan.org/pm/projects/proj_30_sgge.cfm (last visited Dec. 21, 2006) [hereinafter CERP Project]; S. Fla. Water Mgmt. Dist, Acceler8, Picayune Strand (Southern Golden Gate Estates) Restoration, <http://www.evergladesnow.org> (follow "Projects" hyperlink; then follow "Picayune Strand (SGGE)" hyperlink) (last visited Dec. 21, 2006).

175. See Press Release, Florida Department of Environmental Protection, *First Project to Restore America's Everglades Bringing Results* (May 19, 2004), http://www.dep.state.fl.us/secretary/news/2004/may/0519_sfwmd.htm; Press Release, Florida Department of Environmental Protection, *Governor Bush Moving the Earth to Restore Everglades* (Oct. 16, 2003), <http://www.dep.state.fl.us/secretary/news/2003/oct/1016.htm>

176. Barnett Interview, Feb. 7, 2005.

PIR for the project had been prepared.¹⁷⁷ The Chief's letter acknowledged the plugging of the Prairie Canal and installation of culverts under U.S. 41 as items for which the District might receive "credit" under CERP.¹⁷⁸ The Acceler8 Project for Picayune Strand raced ahead. By May 2006, the state was already proceeding with demolition in the Southern Golden Glades Estates area, was well on the way to final designs for road removals, and was preparing a Basis of Design Report for Canals, Roads, and Levee Modifications, part of Phase 2 of the Project.¹⁷⁹ Phase 2 may actually begin as early as August 2006 with the removal of 227 miles of roads. Construction of the three pump stations in Phase 1 should begin in December 2006, and the spreader canals will follow shortly.¹⁸⁰ Thus, even though the PIR for the Project was completed before Florida had even announced its Acceler8 Program in October 2004, the District seemed likely to build the *entire* Project. In other words, federal funds appropriated for Picayune Strand in 2006 based on the November 2004 PIR seemed likely to be shifted to other everglades restoration projects.¹⁸¹

Like Mod Waters to the east, the effectiveness of the Picayune Strand Project in restoring the estuarine systems to its south depends on a sound, scientific understanding of ecological effects of changes in the hydrology and a re-engineering of water flows under U.S. 41. "The Western Tamiami Trails Culverts, Phase 1, Project is adding 16 culverts between CR 92 and SR 29."¹⁸² These additional culverts are supposed to "restore the overland flow from north to south and facilitate the movement of sheetflow changes that result from the Picayune Strand Project."¹⁸³ The Tamiami Trail Culverts are one of the "critical projects" which Congress authorized in 1996, which envisions the eventual construction of 77 culverts and 30 different locations along the western portion of U.S. 41.¹⁸⁴

There is considerable scientific uncertainty about how to

177. Letter from Carl A. Strock, Lt. General, U.S. Army, Chief of Engineers, to Secretary of the Army, (Sept. 15, 2005), http://www.evergladesplan.org/pm/projects/project_docs/pdp_30_sgge/091505_docs_30_chief_final_rpt.pdf.

178. *Id.*, at 4 (*citing* WRDA of 2000 § 601(e)(5)(B)).

179. See Tommy Strowd, Acceler8 Update South Florida Ecosystem Restoration Task Force Meeting (May 17-18, 2006), http://www.sfrestore.org/tf/minutes/2006_meetings/may_17,18/Acceler8_Update_for_Task_Force_Meeting.pdf.

180. Starnes, *supra* note 169, at 217.

181. This is accomplished through the exercise of the Corps' authority to count towards the state's 50% cost-share of CERP project expenses land value and "in-kind" credit. See WRDA of 2000 § 601(e)(5).

182. Starnes, *supra* note 169, at 217.

183. *Id.*

184. U.S. Army Corps of Eng'nrs, Tamiami Trail Culverts, <http://www.saj.usace.army.mil/projects/proj2.htm> (last visited Dec. 21, 2006).

ensure that these changes in the hydrology will improve the situation in the Ten Thousand Islands National Wildlife Refuge. The Refuge has been the subject of considerable scientific study, including quantification of water flows into the refuge, investigation into the dynamics of the marsh-mangrove interface relative to hydrological conditions, and assessing and predicting the impact of hydrologic change to manatee distribution.¹⁸⁵ Considerable uncertainty also exists regarding the current hydrological situation on other public lands in the western Everglades, such as the Florida Panther Wildlife Refuge established in 1989. Since much of the watershed north of the Refuge has been converted to agricultural or residential development, there have been associated hydrological alterations in the undeveloped portions of the landscape as well.¹⁸⁶

There is also uncertainty about the culverts. The Miccosukee Tribe often expresses the position that bridge construction along portions of Tamiami Trail with existing culverts may be unnecessary if the existing culverts are adequately cleaned out and repaired.¹⁸⁷ To address these uncertainties, the District, the Corps, and the Everglades National Park is cooperating in an effort, funded by the District, called “S-12 Flow-way Maintenance,” to study the effect of cleaning out culverts along the Tamiami Trail. The District selected the S-12D structure along the Old Tamiami Trail for its initial effort “because there are less operational constraints” for the project which consists only of maintenance and vegetation management, not any design or operational modifications.¹⁸⁸ If successful, the program may be expanded to the S-12 culverts in the area. The reason there are “less operational constraints” on the District’s experiment with S-12 is that the District, rather than the Department of the Interior, has control of the land on both sides of U.S. 41 at S-12. As explained at a meeting of the South Florida Ecosystem Restoration Task Force in May 2006, the complex and process-oriented regulations regarding the dredging

185. Terry J. Doyle, *The Ten Thousand Islands National Wildlife Refuge - Where We've Been, What's Important, and Where We're Going*, in 2006 GREATER EVERGLADES ECOSYSTEM RESTORATION CONFERENCE, *supra* note 149, at 59; Catherine A Langtimm, et al., *Effects of Hydrological Restoration on Manatees: A Research Program to Integrate Data, Models and Long-Term Monitoring Across the Ten Thousand Islands and Everglades*, *id.*, at 126.

186. Michael Duever, *Hydrological Setting of Florida Panther and Ten Thousand Islands National Wildlife Refuges*, in 2006 GREATER EVERGLADES ECOSYSTEM CONFERENCE, *supra* note 149, at 63.

187. See Tamiami Trail Modifications *supra* note 104 and accompanying text (Miccosukee views rejected in Corps letter deciding to construct Tamiami bridges).

188. Susan Sylvester et al., S-12D Flow-way Maintenance, Task Force Meeting (May 18, 2006), http://www.sfrestore.org/tf/minutes/2006_meetings/may17,18/PDF_File_2006-18May-S12D-TaskF_LeRoy.pdf.

and disposal activities on Park property made an expeditious experiment on federal property less feasible.¹⁸⁹

IV. REFLECTIONS ON THE CASE STUDIES

Adaptive Management participants learn to treat “management” as a series of experiments to be consciously observed, evaluated and acted upon.¹⁹⁰ The Everglades Restoration Projects which we have surveyed along Tamiami Trail can be viewed as experiments in AM to be evaluated for lessons learned. Put another way, we should reflect on these ongoing projects to see if there are useful generalizations for other ecosystem restoration projects in the Everglades or elsewhere.

The first reflection comes easily to public administrators and is embodied in Rufus Miles’s old adage, “[w]here you stand depends on where you sit.”¹⁹¹ The perspectives of government agencies and stakeholders in the Tamiami Trail projects reflect the particular interests and missions. For example, the Everglades National Park Act mandates for the National Park Service

said area or areas shall be permanently reserved as a wilderness, and no development of the project or plan for the entertainment of visitors shall be undertaken which will interfere with the preservation intact of the unique flora and fauna and the essential primitive natural conditions now prevailing in this area.¹⁹²

The Corps, however, has been required to deliver water to Everglades National Park according to a schedule and now must balance the values of environmental restoration, water supply, and flood control in its decisions.¹⁹³ Mod Waters shows the divergence of the interests of these two federal agencies, perhaps even indicat-

189. Author’s personal observation at the meeting of the South Florida Ecosystem Restoration Task Force, in Hollywood, Florida (May 16-17, 2006). Minutes of the meeting are available online, http://www.sfrestore.org/tf/minutes/2006_meetings/may17,18/May2006tfminutes.pdf.

190. See Adaptive Management, Wikipedia, The Free Encyclopedia, http://en.wikipedia.org/wiki/Adaptive_management (last visited Dec. 21, 2006) (“Adaptive management . . . is an iterative process of optimal decision-making in the face of uncertainty, with an aim to reducing that uncertainty over time via system monitoring. In this way, decision-making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management.”).

191. Rufus Miles, *The Origin and Meaning of Miles’ Law*, 38 PUB. ADMIN. REV. 399, 399-402 (1978).

192. 16 U.S.C. § 410c (2006).

193. WRDA of 2000 § 601(b).

ing institutional biases about scientific issues such as the ecological impact of water levels.¹⁹⁴ While the Department of the Interior now has its Everglades Policy Coordinator to develop a uniform perspective among the Park Service and the Fish & Wildlife Service, no similar dispute resolution mechanism or ombudsmen exists among the other federal agencies involved in the Everglades restoration effort, (e.g. the Corps and EPA). Ironically, only when litigation ensues does the conservatives' darling of the "unitary executive" provide such a mechanism in the form of the Department of Justice's mandate to assert a common position on behalf of "the United States Government."¹⁹⁵

This contrasts with the strong role of Florida's Governor in Everglades Restoration at the state level.¹⁹⁶ Over the past year, the Secretary of Florida's Department of Environmental Protection and the Executive Director of the South Florida Water Management District have frequently appeared jointly on happy occasions, such as the various groundbreaking for the Acceler8 Projects, and on less happy ones, such as denying Miami-Dade's request for a Consumptive Use Permit contemplating additional water supply from the Everglades.¹⁹⁷ Thus, public servants in the Everglades Restoration effort seem better able to use state institutions as opposed to federal institutions to implement AM projects (e.g. to experiment with culvert maintenance on District land rather than Park land or to quickly contract to commence construction of the C-111 Spreader Canal).¹⁹⁸

A second reflection concerns the role of public participation. Despite the salute to collaborative and dispute resolution processes in the AM Strategy, the use of such processes is rarely transparent in the Everglades, if these processes are being used at all.¹⁹⁹ Put another way, the AM Strategy's emphasis on "open, inclusive, and integrative" processes is a goal poorly reflected in the case stud-

194. See *supra* notes 80-82, 110-111 and accompanying text.

195. E.g., Robert C. Yale, *Is There An Environmental Lawyer in the House?* FED. LAW., June 2006, at 35, 37 ("However, the Unitary Executive doctrine precludes federal agencies from litigating disputes in the judicial branch.") Christopher Yoo et al., *The Unitary Executive in the Modern Era, 1945-2004*, 90 IOWA L. REV. 601 (2005).

196. See *supra* notes 89-91 and accompanying text.

197. See *The End of South Florida's Free Ride on Everglades water*, MIAMI HERALD, Jan. 29, 2006, at L4; Alan Farago, *Answered Prayer in Florida? Unexpected, Unprecedented Action from Bush*, ORLANDO SENTINEL, Feb. 9, 2006, at A21; Tere Figueras Negrete & Curtis Morgan, *Water Supply puts Crisis on Tap for Dade*, MIAMI HERALD, Jan. 27, 2006, at B1, available at 2006 WLNR 1486315; Press Release, South Florida Water Management District, *Florida Breaks Ground on Fourth Everglades Restoration Project in Less Than Six Months* (June 20, 2006), http://www.dep.state.fl.us/secretary/news/2006/06/0620_02.htm.

198. See *supra* notes 186-188 and accompanying text.

199. See *supra* notes 55-62 and accompanying text.

ies.²⁰⁰ Recreational bass fisherman influenced the geographic span of the physical model for the Decomp Project.²⁰¹ Residents of the 8 ½ Square Mile Area were dissatisfied with the process and sued the Corps over the matter.²⁰² Airboat operators have had extensive discussions with respect to efforts to raise or bridge-over portions of the Tamiami Trail, a part of the Mod Waters Project.²⁰³ But agency interactions with stakeholders is not transparent to anyone other than the stakeholders and the agencies involved. The obvious textbook example is settlement discussions related to a lawsuit, where both the internal agency discussions about strategy and the negotiation sessions between the parties are confidential. But this observation also applies outside the litigation context. Although the CSOP advisory group was structured to allow for “public comment” at the Advisory Team meetings, there is little indication that the general public or the press showed up to comment.²⁰⁴ Similarly, stakeholder meetings in the Acceler8 process do not involve any general notice to the public and are thus, by design, outside the general public’s purview. How these stakeholder discussions have influenced the policy process, outside of the relatively formal CSOP Advisory process, is largely unknown. It is a plausible assumption, however, that fairly small groups with intense interests, such as recreational users of the Everglades and environmentalists, have had considerable impact.²⁰⁵

This leaves the public and the transparent portions of the stakeholder participation process as a less important feature of CERP’s AM Strategy than would appear on the surface. Efforts with CERP to allow public observation guaranteed by the Programmatic Regulations of the Public Delivery Team meetings responsible for planning CERP Projects, have been abandoned for lack of feasibility.²⁰⁶ The general public participation process usu-

200. A leading book on more collaborative approaches to adaptive management, referred to as adaptive co-management, is *NAVIGATING SOCIO-ECOLOGICAL SYSTEMS: BUILDING RESILIENCE FOR COMPLEXITY AND CHANGE* (Fikret Berkes et al. eds., 2003).

201. See *supra* note 154 and accompanying text.

202. See *supra* notes 97-98 and accompanying text.

203. The 1989 Act prohibited airboat use in the Everglades National Park other than airboat tour operators that were operating on January 1, 1989 (i.e. Coopertown Airboat Tours, Gator Park Airboat Tours, and Everglades Safari Park). See 16 U.S.C. § 410r-7(c) (2006).

204. See Charter, *supra* note 135; see generally *Miccosukee Tribe v. Southern Everglades Restoration Alliance*, 304 F.3d 1076 (11th Cir. 2002) (Southern Everglades Restoration Alliance is an “advisory committee” subject to Federal Advisory Committee Act).

205. See *supra* notes 153-157 and accompanying text.

206. See Minutes of South Florida Ecosystem Restoration Working Group 4-5 (Jan. 19-20, 2006), http://www.sfrestore.org/wg/wgminutes/2006meetings/19,20jan2006/final_jan2006_wgminutes.pdf (“Patrick Hayes said . . . it was unacceptable to go from meeting every other month to no meetings for almost a year and a half was unacceptable.”); CERP Meetings with Public Access, http://www.evergladesplan.org/pm/public_meetings/meetings.aspx;

ally consists of “notice and comment” on various technical and decision-making documents which are already close to final before general public comment is solicited.²⁰⁷ Even this salute to public participation may be abandoned in the urgency of the moment, as it was with the Prairie Canal portion of the Picayune Strand Project.²⁰⁸

A third reflection concerns the connection between the AM Process and “policy decisions by CERP sponsoring agencies.”²⁰⁹ The AM Strategy would vest the scientific interface of these “policy decisions” in a newly-created entity called the System Planning and Operations Team (SPOT) who are then charged with “Box 3: Management/Science Integration.”²¹⁰ To the extent that SPOT is intended to provide a forum for system-wide intergovernmental coordination, it seems to duplicate the role presently being performed by the South Florida Ecosystem Restoration Task Force, at least in conjunction with its Working Group.²¹¹ The AM Strategy vaguely envisions only “comments and input during options development and options analysis” from stakeholders and the public.²¹² Thus, direct influence of “policy decisions” would appear outside the AM process altogether, through politics or litigation. This certainly seems true in the case studies. Resolution of the 8 ½ Square Mile Area controversy came about through specific congressional legislation.²¹³ The process of how this occurred in Congress is not evident from a review of the administrative record. The process through which Decomp Project managers decided to “work around” the interests of the bass fisherman rather than to oppose them is similarly outside the public purview.²¹⁴ As were the negotiations leading to the buyout of Hardy, the limestone mining holdout in the Picayune Strand Project.²¹⁵ A more candid description of the AM Process would make a more explicit reference to the mechanisms of final “policy” decision-makers, *e.g.* congressional commit-

Light, *supra* note 18. *Cf.* 33 C.F.R. § 385.18(b) (2006) (guaranteeing advance notice of project delivery team meeting open to the public with opportunity for public comment). The PDTs were structured so as to avoid application of the Federal Advisory Committee Act and Florida Sunshine Act requirements. CERP Guidance Memorandum 011.02, Federal Advisory Committee Act Requirements for CERP Teams (April 28, 2003), http://www.cerpzone.org/documents/cgm/cgm_011.02.pdf; CERP Guidance Memorandum 034.00, Florida Sunshine Act Requirements (Dec. 18, 2003), http://www.cerpzone.org/documents/cgm/cgm_034.00.pdf.

207. *Id.*

208. *See supra* notes 173-175 and accompanying text.

209. AM Strategy, *supra* note 23.

210. *Id.*, at 5.

211. *See* Water Resources Development Act of 1996, Pub. L. 104-303, § 528(f) (1996).

212. AM Strategy, *supra* note 23, at 7.

213. *See supra* note 99 and accompanying text.

214. *See supra* notes 153-154 and accompanying text.

215. *See supra* note 173 and accompanying text.

tees, the Governor, or the District's Governing Board. Isolation of the overtly litigious or political dimensions of the process is misleading.

Systematic exploration in the AM Strategy of these critical "outside" decision-making processes could be illuminating. Constitutional lawyers viewing the congressional compromises "conditionally authorizing" projects (subject to the approval of a subsequent Congress' committees) or tying authorizations to executive branch agencies of water quality certifications would find serious separation of powers issues, perhaps even clear violations.²¹⁶ The process through which the Governor selected the "eight" Acceler8 Projects, *e.g.* Picayune Strand, C-111 Spreader Canal, for accelerated construction using \$1.8 billion of bonds backed by ad valorem taxes is unknown.²¹⁷ The natural scientists running CERP's AM process could use the scholarship of political scientists on these questions.²¹⁸

A fourth reflection concerns ambiguity in the concept of "robustness" in the AM Strategy. A "robust" project under the AM Strategy is one "that can be adapted to uncertain or changing future conditions."²¹⁹ This conflates two different phenomena to which a manager must adapt: (1) changes in the assumptions and reduction of the uncertainty about the ecosystem resulting from the "learning by doing" AM approach and (2) changes in the environment external to the Everglades Restoration AM process, or assumptions about those changes, beyond overt AM experimentation. For example, there may be adaptations in the C-111 Spreader Canal Project because of new learning about the extent of agricultural contamination, hydrological connections, or vegetative responses to increased water levels.²²⁰ There could also be ad-

216. *See supra* note 145 and accompanying text.

217. *E.g.* Minutes of South Florida Ecosystem Restoration Working Group Meeting 3 (Oct. 28, 2004), http://www.sfrestore.org/wg/wgminutes/2004meetings/28,29oct04/final_wg_minutes.pdf (Terry Rice complaining on behalf of Miccosukee Tribe that the District went "behind closed doors to come up with a new plan" for accelerating financing).

218. Political scientists have long described the actual policymaking process often used in the presence of complexity and uncertainty as "disjointed incrementalism." *E.g.*, D. BRAYBROOKE AND CHARLES E. LINDBLOM, *A STRATEGY OF DECISION* (1963); JAMES W. FESLER & DONALD F. KETTL, *THE POLITICS OF THE ADMINISTRATIVE PROCESS* (1991); CHARLES E. LINDBLOM, *THE INTELLIGENCE OF DEMOCRACY* (1965); JEFFREY L. PRESSMAN & AARON B. WILDAVSKY, *IMPLEMENTATION* (1973); AARON B. WILDAVSKY, *THE POLITICS OF THE BUDGETARY PROCESS* (1964); John Forester, *Bounded Rationality and the Politics of Muddling Through*, 44 *PUB. ADMIN. REV.* 23 (1984); James W. Fredrickson & Anthony L. Iaquinto, *Inertia and Creeping Rationality in Strategic Decision Processes*, 32 *ACAD. OF MGMT. J.* 516 (1989); Charles E. Lindblom, *The Science of Muddling Through*, 19 *PUB. ADMIN. REV.* 79 (1959); Charles E. Lindblom, *Still Muddling, Not Yet Through*, 39 *PUB. ADMIN. REV.* 517 (1979).

219. AM Strategy, *supra* note 23, at 1.

220. The death of birds at Lake Apopka has sensitized the District to the need to as-

aptations because of changing land use from agricultural to urban or increased traffic on U.S. 1 and Card Sound Road or for sea-level rise resulting from global warming.²²¹ Robust experimental designs within CERP are possible for the first, but only quasi-experimental designs or modeling is possible for the second type of change.²²²

“Robustness” in these case studies along the Tamiami Trail largely translates into a form of incrementalism.²²³ Initial tentative steps collect information which then feeds into subsequent steps. The Programmatic Regulation’s model of a single feasibility study leading to a single selection of an alternative in the PIR is not what actually occurs.²²⁴ Instead, projects are “phased” or divided into parts with separate PIRs, so that later phases can take advantage of learning in the earlier phases, and respond to limitations in available funds in any particular year.²²⁵ The separate PIRs may trigger supplemental EISs or even new NEPA environmental assessments.²²⁶ This is the inevitable consequence of mar-

sess potential effects of agricultural chemicals on lands being converted to reservoirs. See South Florida Water Management District, Pre-Acquisition Environmental Assessment Process, Identification of Residual Agrochemicals Resulting from Current or Historical Agricultural Activities, Corrective Actions and Ecological Risk Assessment (April 20-21 2006), <http://www.sfrestore.org/wg/wgminutes/2006meetings/20,21apr2006/ResidualAgrochemicals.pdf>. See also Steve Patterson, *Lake Apopka: An Environmental Tragedy*, FLORIDA TIMES-UNION, Feb. 27, 1999, http://www.jacksonville.com/tu-online/stories/022799/met_2a1apopk.html (describing Lake Apopka bird kill).

221. *E.g.*, Natural Resources Defense Council, *How Global Warming Will Affect Floridians*, <http://www.nrdc.org/globalWarming/flaeffects/effect6.asp> (last visited Dec. 21, 2006); Dan Vergano, *Sea change coming for the Everglades*, USA TODAY, May 30, 2006, available at http://www.geo.utexas.edu/climate/NEWS/May31_2006.htm; Mongabay.Com, *Invasive species may increase with global warming* (Oct. 13, 2005), <http://news.mongabay.com/2005/1013-invasive.html>.

222. See generally DONALD T. CAMPBELL & JULIAN C. STANLEY, EXPERIMENTAL AND QUASI-EXPERIMENTAL DESIGNS FOR RESEARCH (1963).

223. See *supra* note 219 and accompanying text.

224. The PIR process is set forth at 33 C.F.R. § 385.26 (2006).

225. For example, there was a supplemental environmental impact statements for the Indian River Lagoon- South Project, and the Water Preserve Areas Feasibility Study. IRL-South Final Project Implementation Report (PIR) (Mar. 2004), http://www.evergladesplan.org/pm/studies/irl_south_pir.cfm; Draft Feasibility Report and Supplemental Environmental Impact Statement (SEIS): Water Preserve Areas Feasibility Study (Oct. 2001), http://www.evergladesplan.org/pm/studies/wpa_report.cfm. The Everglades Agricultural Area (EAA) Storage Reservoir is being phased. See Everglades Agricultural Area (EAA) Storage Reservoir (Phase-1), http://www.evergladesplan.org/wrda2000/ini_proj/ea_a_storage_res.aspx (last visited Dec. 21, 2006). Similarly, the environmental assessment for Picayune Strand was divided into phases; see Picayune Strand (Southern Golden Gate Estates) Hydrologic Restoration: Integrated Project Implementation Report (PIR)/ Environmental Impact Statement (Nov. 2004), http://www.evergladesplan.org/pm/projects/docs_30_sgge_pir_final.cfm.

226. The subject of post-decision supplemental environmental impact statements is not expressly addressed in NEPA but is at times needed to satisfy the Act’s purpose. See *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 370-71 (1989); see also *Wisconsin v. Weinberger*, 745 F.2d 412 (7th Cir. 1984) (court will determine whether or not the new information presents a seriously different picture of the likely environmental consequences of

rying a “notice and comment” legal regime under WRDA 2000 and NEPA with the AM concept.²²⁷ Even if adaptations cannot be “continuous” as AM ideally envisions, incremental staging of projects has been a reality.²²⁸ Thus, Mod Waters and Decomp encompass experimental designs prior to the later stages of construction.²²⁹ Picayune Strand will build upon learning associated with the filling of the Prairie Canal.²³⁰ Maintenance of the S-12 culverts will build upon the learning associated with the S-12D clean-out experience.²³¹

As a fifth reflection, we might ask a larger question related to these observations. As Professor Ruhl at Florida State University recently queried, “Regulation by Adaptive Management - Is It Possible?”²³² “In short,” he explains, “in order for adaptive management to flourish in administrative agencies, legislatures must empower them to do it, interest groups must let them do it, and the courts must resist the temptation to second-guess when they do in fact do it.”²³³ The basic problem is that the conventional administrative law system is geared to “command and control,” where activity is regulated using permits that target emissions or discharges for limitation. During the permit period, changes in the terms are not anticipated — *i.e.* no adaptation based on learning by doing is allowed. Greg Knecht, a Florida DEP official responsible for permitting CERP projects explains,

Traditionally, permits for the construction and operation of water resources projects are issued based upon the anticipated environmental impacts of construction and subsequent operation. Much of the understanding about project effects is garnered from interpreting results of predicting modeling. Yet, often these permits specify conditions that will govern

the proposed action not adequately envisioned by the original EIS); *Sierra Club v. Froehlke*, 816 F.2d 205 (5th Cir. 1987) (information produced and used by the Corps that does not seriously change the environmental picture, but that nevertheless affects, or could affect, the decisionmaking process, is subject to the procedural requirements of NEPA).

227. WRDA of 2000, § 601(h)(4)(A)(iii)(III) (requiring PIRs to “comply” with NEPA); Preamble to the Programmatic Regulations, 68 Fed. Reg. 64200, 64216-17 (Nov. 12, 2003) (describing compliance with NEPA under CERP); *cf.* *Seattle Audubon Soc. v. Lyons*, 871 F. Supp. 1291, 1311 (W.D. Wash. 1994) (“Given the current condition of the forests, there is no way the agencies could comply with the environmental laws without planning on an ecosystem basis.”).

228. *See supra* notes 35-43 and accompanying text.

229. *See supra* notes 63-157 and accompanying text.

230. *See supra* notes 172-79 and accompanying text.

231. *See supra* notes 187-189 and accompanying text.

232. J.B. Ruhl, *Regulation by Adaptive Management - Is It Possible?* 7 MINN. J. L., SCI., & TECH. 21 (2005).

233. *Id.* at 31.

a project for years. An AM approach to the permitting process would recognize uncertainty and would allow permits to be issued with the understanding that as knowledge increases about the specific construction and operation of a water resources project, the permit would be flexible enough to address these changes.²³⁴

Both CERP and Florida law require that CERP projects be in compliance with regulatory requirements. The Programmatic Regulations require the Corps in a PIR to “comply with all applicable Federal, State, and tribal laws.”²³⁵ The State of Florida, in turn, has linked the participation in a CERP project by the non-federal sponsor (the District) to specific findings regarding a PIR. Florida Statutes, sec. 373.1501 requires the District to convene a “preapplication conference with all state and federal agencies with applicable regulatory jurisdiction.”²³⁶ The District must “[d]etermine with reasonable certainty that all project components are consistent with applicable laws and regulations, and can be permitted and operated as proposed.”²³⁷ The District determination in this regard is subject to the approval of the Florida Department of Environmental Protection (DEP) “[b]efore any project component is submitted to Congress for authorization or receives an appropriation of state funds.”²³⁸ State law also requires the District to prepare its own project implementation report “[p]rior to executing a project cooperation agreement with the Corps for the construction of a project component.”²³⁹ Significantly, judicial challenges are postponed until DEP acts to approve the project during the first phase since CERPRA declares that actions by the District under step one do not constitute “final agency action.”²⁴⁰

CERPRA permitting, like the federal NEPA process, follows a traditional administrative law structure, which exhibits a considerable tension with the “learning by doing” and continuous feedback which the CERP AM Strategy contemplates. AM contemplates that a complicated “compliance” metric, where simple comparison of discharges against an effluent limitation are not,

234. Greg Knecht & Tom St. Clair, *Comprehensive Everglades Restoration Plan (CERP) Regulatory Permitting Adaptive Management Application*, in 2006 GREATER EVERGLADES ECOSYSTEM RESTORATION CONFERENCE, *supra* note 149, at 121.

235. 33 C.F.R. § 385.26(a)(3)(iii) (2006).

236. Fla. Stat. § 373.1501(5)(c) (2006).

237. *Id.*

238. Fla. Stat. § 373.026(8)(b) (2006).

239. Fla. Stat. § 373.470(3)(c) (2006).

240. Fla. Stat. § 373.1501(8).

and should not be, considered sufficient.²⁴¹ From an administrative law point of view, the analogous model is probably the consent order or consent decree, in which an administrator or judge assesses whether a regulated party is performing adequately enough in order to bring itself into ultimate compliance after violations have been found, have been conceded, or are assumed.²⁴² Administration of such an administrative or judicial “settlement,” however, anticipates the existence of a neutral administrator or judge who may resolve conflicts on an equitable basis if and when the parties are unable to agree. Despite the continuing jurisdiction of the federal court arising out of the 1988 lawsuit on limited water quality issues, there is no equivalent court or “special master” for the overall effort to restore the Everglades.²⁴³ Judicial review is diffused.²⁴⁴

Finally, however, let us end with an observation about the person who began the Tamiami Trail, Barron Gift Collier. After purchasing 1.3 million acres in what later became Collier and Hendry counties, the streetcar advertising magnate envisioned the Trail connecting his vast holdings from Miami to Tampa.²⁴⁵ Even today, his family’s company develops parcels of this land, *e.g.* breaking ground February 17, 2006, on the new town of Ave Maria, Florida, near Naples,²⁴⁶ exploits oil fields,²⁴⁷ and continues vegetable farming, packing and marketing, citrus production, and cattle ranching.²⁴⁸ Much of the Big Cypress National Reserve,

241. The AM search is for an alternative to such prescriptive regulation, *e.g.* market-based programs, information-based programs, negotiated project-specific licensing, ecosystem-scaled land management programs, multi-party collaborative planning efforts, or government-private quasi-partnerships. See Ruhl, *supra* note 232 at 25-26. “In short, the decentralized nature of the second generation instruments of regulation allows agency policies and decisions to be implemented more adaptively, which, it is reasonable to believe, will facilitate a more responsive, flexible continuum of reactions to the future’s amorphous regulatory challenges.” *Id.* at 27.

242. Prior to enactment of CERCLA, during the Carter Administration, cleanup of hazardous waste sites proceeded mainly through a series of injunction suits under authorities such as RCRA § 7003, which contemplated judicial supervision of a mandatory injunction or any consent decree arising out of the suit. These very general authorities granted the courts wide latitude in tailoring the injunctive relief to the precise circumstances on the ground. See generally Susan Verdichio, *Environmental Restoration Orders*, 12 B.C. ENVTL. AFF. L. REV. 171 (1985).

243. See *supra* notes 69-74 and accompanying text.

244. See generally Alfred R. Light, *The Waiter at the Party: A Parable of Ecosystem Management in the Everglades*, 36 ENVTL. L. REP. (forthcoming Oct. 2006); Light, *supra* note 62, at 116-23, 128.

245. See *supra* note 7 and accompanying text; Barron Collier Partnership, History, <http://barroncollier.com/History/HistoryFrameSet.htm> (last visited Dec. 21, 2006).

246. See Ave Maria, Florida, <http://www.avemaria.com> (last visited Dec. 21, 2006).

247. See Barron Collier Partnership, Minerals, <http://barroncollier.com/Minerals/MineralFrmSet1.htm> (last visited Dec. 21, 2006).

248. See Barron Collier Partnership, Agriculture, <http://barroncollier.com/Agriculture/AgFrameSet.htm> (last visited Dec. 21, 2006).

Florida Panther Wildlife National Refuge, and Ten Thousand Islands National Wildlife Refuge belonged to Collier, and his family's retention of oil and mineral rights on these lands sparks controversy today.²⁴⁹ Everglades Restoration is, in part, the reassembly and reconnection of conservation lands along the western portion of the Tamiami Trail which Collier once ruled.²⁵⁰ Ecosystem rehabilitation seems more plausible as one moves west out of the political morass of the 8 ½ Square Mile Area and Decomp Projects in Miami-Dade, the portion of the Trail Jaudon built, and into the Big Cypress Basin where Collier used to reign. Barron Gift Collier continues to shape the Everglades along his portion of the Tamiami Trail.

249. See National Park Service, Big Cypress Preserve Acquisition of Collier Resources Mineral Rights (May 29, 2002), <http://www.nps.gov/bicy/qnaoil.pdf>; Press Release, Public Employees for Environmental Responsibility, *The Immaculate Scandal: Big Cypress Oil Scammers Go Scot-Free* (June 23, 2005), http://www.peer.org/news/news_id.php?row_id=541.

250. Existing and proposed conservation lands in the Big Cypress Basin - Estero Bay Region spanning Collier, Lee, Hendry, Miami-Dade, and Monroe Counties spans 2,800 square miles and includes Big Cypress National Preserve, Big Cypress Seminole Indian Reservation, Collier Seminole State Park, Corkscrew Regional Ecosystem Watershed (CREW), Corkscrew Swamp Sanctuary, Estero Bay Aquatic Preserve, Everglades National Park, Fakahatchee Strand Preserve, Florida Panther National Wildlife Refuge, Koreshan State Park, Lake County Park Miccosukee Indian Reservation, Okaloacoochee Slough, Picayune Strand State Forest, Rookery Bay National Estuarine Research Reserve, Six-Mile Cypress, and Ten Thousand Islands National Wildlife Refuge. See Big Cypress Basin - Estero Bay Regional Research Database Project, <http://ocean.floridamarine.org/bcboverview.htm> (last visited Dec. 21, 2006).

GLOBAL RBCA: ITS IMPLEMENTATION, FOUNDATION IN RISK-BASED
THEORY, AND IMPLICATIONS

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I.	INTRODUCTION.....	102
II.	THE ORIGINS, JUDICIAL TREATMENT, AND TOXICOLOGICAL MECHANISMS UNDERPINNING HUMAN HEALTH RISK ASSES- MENT.....	105
	<i>A. The Origins of Federal Risk Assessment Utilization.....</i>	105
	1. The National Academy of Sciences' <i>Red Book</i>	107
	2. The Development of Risk Assessment Methodology un- der CERCLA.....	108
	<i>B. Judicial Affirmation of Risk Assessment Techniques.....</i>	108
	1. <i>Industrial Union v. American Petroleum Institute</i>	109
	2. <i>Public Citizen Health Research Group v. Tyson</i>	110
	3. <i>Natural Resources Defense Council v. EPA</i>	111
	<i>C. Theories of Toxicity.....</i>	112
	1. Carcinogens.....	113
	2. Noncarcinogens.....	114
III.	HAZARDOUS WASTE REMEDIATION IN FLORIDA.....	116
	<i>A. The Traditional Regulatory Structure in Florida.....</i>	116
	1. The Risk-Based Corrective Action Program.....	117
	2. The RCRA Program.....	118
	3. The CAP/RAP Process.....	118
	<i>B. Risk-Based Corrective Action under Chapter 62-777.....</i>	119
	1. Brief Introduction to Risk Calculation.....	119
	2. Cleanup Target Levels.....	123
	3. Florida's Tiered Approach to Risk-Based Regulation.....	124
	4. Risk-Based Restrictions on Land se.....	125
IV.	SECTION 376.30701, FLORIDA STATUTES, AND THE GLOBAL RBCA RULE.....	126
	<i>A. The Substantive Effects of Global RBCA.....</i>	127
	1. Offsite Migration and the Notice Provision.....	127
	2. Controversial Technical Issues under Chapter 62-780.....	128
	<i>B. The Problematic Implications of Global RBCA.....</i>	129
	1. The Dawn of New ARARs.....	129
	2. The Unhealthy Reliance upon Institutional Controls.....	133
V.	CONCLUSIONS.....	137

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I. INTRODUCTION

During the 2003 Regular Session, the Florida Legislature enacted CS/HB 1123, commonly referred to as “Global Risk-Based Corrective Action” or “Global RBCA.”² Subsequently signed by Governor Jeb Bush on June 20, 2003, and codified at section 376.30701, *Florida Statutes*, Global RBCA mandates that risk-based corrective action, a process which bases remedial action on potential human health effects resulting from exposure to chemical compounds, be implemented at all contaminated sites in Florida.

Hardly new, RBCA has been implemented in Florida at sites impacted by petroleum products, dry cleaning operations, and brownfield sites, collectively referred to as “program sites,” since the late 1990’s.³ At such sites, RBCA principles governed corrective action by establishing contaminant target cleanup levels (CTLs), risk-based target concentrations, for a variety of chemical contaminants based upon either conservative default assumptions or site-specific data. Although originally the rule for each of the program sites with CTLs for chemicals relevant to that particular program, the Florida Department of Environmental Protection (FDEP), in 1999, decided to consolidate all of the CTLs into Chapter 62-777, *Florida Administrative Code*. Although Chapter 62-777 lacked a process by which RBCA was to be conducted, it provided a regulatory repository for CTLs, enabling CTLs for identical chemicals to be located in one rule rather than scattered throughout three rules. In addition, FDEP provided the risk methodology used to calculate CTLs in the guidance document *Technical Report: Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-777, F.A.C. (CTL Technical Report)*.⁴

The RBCA program embodied by Chapter 62-777 and the rules developed for the program sites employed a three-tiered approach that permits an increasingly detailed level of assessment when default assumptions are believed to overstate actual site

2. Act effective June 20, 2003, ch. 2003-173, 2003 Fla. Laws 173 (codified at FLA. STAT. § 376.30701 (2005)).

3. See generally FLA. ADMIN. CODE ANN. r. 62-770 (2005) (Petroleum Contamination Site Cleanup Criteria) [hereinafter Petroleum Rule]; FLA. ADMIN. CODE ANN. r. 62-782 (2005) (Drycleaning Solvent Cleanup Criteria) [hereinafter Drycleaning Rule]; FLA. ADMIN. CODE ANN. r. 62-785 (2005) (Brownfields Cleanup Criteria) [hereinafter Brownfields Rule]; FLA. ADMIN. CODE ANN. r. 62-777 (2005) (Contaminant Cleanup Target Levels).

4. CHRISTOPHER J. SARANKO ET AL., TECHNICAL REPORT: DEVELOPMENT OF SOIL CLEANUP TARGET LEVELS (SCTLs) FOR CHAPTER 62-777, F.A.C., (May 26, 1999) *superseded* by CTR. FOR EVNTL. & HUMAN TOXICOLOGY, UNIV. OF FLA., TECHNICAL REPORT: DEVELOPMENT OF CLEANUP TARGET LEVELS (CTLs) FOR CHAPTER 62-777, F.A.C., (Feb. 2005) [hereinafter CTL TECHNICAL REPORT].

conditions. Global RBCA takes these existing risk-based principles and applies them to the remainder of Florida's contaminated sites. However, due to this universal application, the prescriptive nature of RBCA,⁵ and the consolidation of the rulemaking process with that of previously enacted risk-based rules,⁶ environmental organizations and industry appeared in force to participate in the formal process to adopt rules implementing Global RBCA.⁷ Due to this healthy debate, the formal rulemaking proved to be quite an administrative challenge.⁸ In fact, although the Legislature passed CS/HB 1123 in 2003 and demanded promulgation of implementing rules by July 1, 2004,⁹ the FDEP required nearly two years of debate to eventually promulgate Chapter 62-780 of the *Florida Administrative Code* on February 3, 2005.¹⁰

Without a doubt, Global RBCA creates uniformity amongst Florida's contaminated sites — something sought by the regulated parties, environmentalists, and the FDEP for several years.¹¹ However, since its inception and rise to prominence in the 1970's,¹² many view the concept of risk assessment as a “black box” — inputting data and receiving an answer without truly understanding how that answer was calculated.¹³ In fact, none other than one

5. Global RBCA utilizes a three-tier approach, which, at the first two tiers, requires use of default exposure parameters. Use of site-specific data is only permitted at later stages of the risk evaluation. *See infra* Section III.B.3.

6. Due to the common ground shared between Global RBCA and chapters 62-770 (Petroleum Rule), 62-782 (Drycleaning Rule), 62-785 (Brownfields Rule), and 62-777 (Contaminant Cleanup Target Levels) of the *Florida Administrative Code*, the FDEP elected to merge the adoption of Global RBCA rules with that of these other programs. Memorandum from John M. Ruddell, Director, Div. of Waste Mgmt., FDEP, to Directors of District Management, Waste Program Administrators, District Waste Program Staff, Division of Waste Management Staff (Sept. 24, 2003), *available at* http://www.dep.state.fl.us/waste/quick_topics/publications/wc/GlobalRBCA_Implemnt.pdf.

7. The formal rulemaking process consisted of three public workshops held by the Florida Department of Environmental Protection (FDEP) to facilitate public participation, an FDEP briefing of the Environmental Regulation Commission (ERC), the executive-appointed board responsible for adopting environmental rules, and the ERC adoption meeting. The FDEP makes the agendas and presented materials for these four meetings. Historical Information, <http://www.dep.state.fl.us/waste/categories/wc/pages/RuleAdoptionHistoricalInformation.htm> (last visited Nov. 12, 2006).

8. According to FDEP's website, the FDEP received 53 comments and eight proposed amendments to the proposed rules. *Id.*

9. FLA. STAT. § 376.30701(2) (2005).

10. *See generally* Chris Saranko, *The Environmental Regulation Commission Adopts Global RBCA*, 26 ENVTL. & LAND USE L. SEC. REP. 3, 3 (2005) [hereinafter *ERC Adoption*] (describing the adoption process).

11. *See* GEOFF SMITH ET AL., DRAFT REPORT, CONTAMINATED SOILS FORUM POLICY SUBCOMMITTEE CLEANUP FOCUS GROUP 8-14 (Nov. 24, 1998), *available at* http://www.dep.state.fl.us/waste/quick_topics/publications/wc/csff/focus/112498.pdf (established by FDEP to provide a forum for discussion of Florida environmental law, the Contaminated Soils Forum consists of industry, state regulators, consultants, researchers and lawyers).

12. *See infra* Section II.A.

13. *See, e.g.*, Mark Eliot Shere, *The Myth of Meaningful Environmental Risk Assessment*, 19 HARV. ENVTL. L. REV. 409, 490 (1995).

of risk assessment's greatest proponents, William Ruckelshaus, once cautioned to "remember that risk assessment data can be like the captured spy: if you torture it long enough, it will tell you anything you want to know."¹⁴

From this author's perspective, the black-box nature of risk assessment becomes particularly enhanced when numeric standards are based upon risk principles. With published standards, in this case CTLs, an interested party only observes a not-to-exceed value for a particular contaminant without knowing the assumptions, inputs, and formulas used to calculate that value. As such, we move a step further away from the underlying exposure assessment and risk characterization which form the basis of that standard and, effectively, insulate the risk methodology from scrutiny.

With the enactment of Global RBCA and promulgation of Chapter 62-780, it becomes crucial that the science behind these now universal standards is understood by those regulated by them. Furthermore, notwithstanding the appeal of a uniform regulatory scheme, the implementation of Global RBCA is likely to create lesser known consequences, such as imposing new applicable or relevant and appropriate standards (ARARs) on Superfund sites in Florida¹⁵ and limiting a local government's ability to regulate land use.¹⁶

Therefore, this Note has two purposes. First, because of the aforementioned black-box nature of risk assessment, this Note attempts to provide a solid understanding of the history of human health risk assessment and the risk-based principles incorporated into the Global RBCA program. Second, this Note evaluates two problematic implications of Global RBCA: creation of new ARARs and interference with Florida's growth management regime.

In the discussion that follows, Section II examines the origins of human health risk assessment, the judiciary's acceptance and contribution to its use, and a discussion of chemical toxicity. Section III of this Note presents the traditional regulatory structure under which environmental remediation occurred in Florida, including an in-depth discussion of the risk-based methodology employed under Chapter 62-780. Section IV of this Note explains the details of Global RBCA and the contentious issues deliberated upon during rulemaking. In addition, Section IV presents two major implications of Global RBCA's enactment: the creation of new

14. William D. Ruckelshaus, *Risk in a Free Society*, 4 RISK ANALYSIS 157, 157-58 (1984) (echoing the *Red Book's* warning to separate risk assessment from risk management).

15. See *infra* Section IV.B.1.

16. See *infra* Section IV.B.2.

ARARs for Comprehensive, Environmental, Response, Compensation, and Liability Act (CERCLA) sites located in Florida and the potential disruption to Florida's growth management system. Finally, Section V summarizes and concludes.

II. THE ORIGINS, JUDICIAL TREATMENT, AND TOXICOLOGICAL MECHANISMS UNDERPINNING HUMAN HEALTH RISK ASSESSMENT

To grasp why the Florida Legislature elected to implement Global RBCA and to understand the unintended implications of its enactment, it is necessary to appreciate the scientific, legislative, and judicial origins of human health risk assessment. The following sections provide a general background of risk assessment, concluding with a discussion of carcinogenic and noncarcinogenic theories of toxicity.

A. *The Origins of Federal Risk Assessment Utilization*

Although this Note focuses upon risk assessment and its application in environmental regulatory schemes, the Food and Drug Administration (FDA) was the first federal administrative agency to utilize risk assessment as a means of addressing potential for adverse human health effects.¹⁷ In 1950, Congress prohibited foods containing "poisonous or deleterious" substances¹⁸ and demanded that food additives must be "safe."¹⁹ In what became a crucial addition to this legislation, the so-called Delaney Clause altogether prohibited carcinogenic food additives.²⁰ Subsequently, the FDA began analyzing and assessing the potential toxicity of food additives and established many of the metrics which are used in risk assessments today.²¹

Although Congress incorporated the Delaney Clause in 1958, outside of the FDA, federal agencies failed to utilize risk assessment until the 1970's when the U.S. Environmental Protection

17. Matthew D. Adler, *Against "Individual Risk": A Sympathetic Critique of Risk Assessment*, 153 U. PA. L. REV. 1121, 1133 (2005).

18. 21 U.S.C. § 342(a) (2000).

19. 21 U.S.C. § 348(c)(3)(A) (2000).

20. See Food Additives Amendment of 1958, Pub. L. No. 85-929, § 2, § 409(c)(3)(A), 72 Stat. 1784, 1786 (codified at 21 U.S.C. § 348(c)(3)(A) (2000)) ("[N]o additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or if it is found, after tests which are appropriate for the evaluation of the safety of food additives, to induce cancer in man or animal...."). *Id.*

21. For example, FDA developed the No Observed Adverse Effect Level (NOAEL), considered a safe level for noncarcinogens, and the one-in-one-million acceptable risk level for carcinogens.

Agency (EPA) and the Occupational Safety and Health Association (OSHA) began recognizing risk assessment as a means of regulation.²² Notwithstanding the EPA and OSHA's use of risk assessment principles, three prominent developments spurred the risk assessment's establishment as a staple of administrative decision making.²³ First, in *Industrial Union Department v. American Petroleum Institute*,²⁴ the United States Supreme Court demanded that OSHA make some effort to quantify the costs and benefits of health and safety regulation²⁵ and generally encouraged federal utilization of risk assessment.²⁶ Second, in 1983 Ronald Reagan appointed William Ruckelshaus, a staunch supporter of risk assessment, to the position of the EPA Administrator.²⁷ Third, the 1983 publication of the National Academy of Sciences' (NAS) seminal *Risk Assessment in the Federal Government: Managing the Process*, or the "Red Book",²⁸ provided a valuable, standardized framework for federal risk assessment.²⁹

Although having expanded to a variety of state and federal regulatory schemes, risk assessment, at least in a procedural sense, remains nearly unaltered from the general methodology presented in the *Red Book*. In fact, the EPA adopted the *Red Book* methodology when developing its influential CERCLA risk assessment procedure.³⁰ The following sections examine the influential methodologies presented in the *Red Book* and the regulatory framework adopted pursuant to CERCLA.

1. *The National Academy of Sciences' Red Book*

22. CRS REPORT FOR CONGRESS, ENVIRONMENTAL RISK ANALYSIS: A REVIEW OF PUBLIC POLICY ISSUES II, 98-618 ENR (1998), at 1.

23. Adler, *supra* note 16, at 1134.

24. 448 U.S. 607 (1980). Section II.B.1. provides a more thorough evaluation of *Industrial Union*.

25. *Id.* at 642-43.

26. Randall S. Wentsel, *Application of Risk Assessment in Policy and Legislation in North America*, in HANDBOOK OF ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT, 261, 262 (1998).

27. John D. Graham, *Historical Perspective on Risk Assessment in the Federal Government*, 102 TOXICOLOGY 29, 39 (1995).

28. NAT'L RESEARCH COUNCIL, NAT'L ACAD. OF SCIENCES, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS (1983) [hereinafter RED BOOK].

29. Interestingly, the *Red Book* arose from a NAS study authorized by Congress in reaction to risk policy developed by the Interagency Regulatory Liaison Group (IRLG). The IRLG consisted of representatives from the EPA, OSHA, the Consumer Product Safety Commission, FDA, and the Department of Agriculture and sought to coordinate risk management across federal agencies. However, critics argued that the policy developed by the IRLG permitted politics to influence scientific judgments. See CRS REPORT FOR CONGRESS, *supra* note 22.

30. OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROT. AGENCY, RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME I, HUMAN HEALTH EVALUATION MANUAL (PART A) 1-1 (Dec. 1989) [hereinafter RAGS PART A].

Unequivocally, the underlying foundation of risk assessment is that risk is a product of a chemical's toxicity and a person's exposure to that chemical.³¹ As a means of quantifying that potential risk, the *Red Book* developed a four-step process: hazard identification, toxicity assessment, exposure assessment, and risk characterization.³²

Importantly, the *Red Book* distinguishes the scientific and mathematical concept of risk assessment from the subjective and often political concept of risk management.³³ To wit, risk assessment demands a detailed evaluation of data and typically utilizes a prescriptive set of procedures to arrive at a hard, quantitative value.³⁴ On the other hand, risk management entails a subjective decision whether to take action upon the quantitative results of the risk assessment or to remain idle.³⁵ As such, risk management balances potential risks with political, economic, and social policy issues and often involves a decision as to how much risk is acceptable.³⁶

Of course, the demarcation between science and policy oftentimes becomes blurred and nearly indistinguishable: an issue not lost upon the NAS.³⁷ An oft-criticized aspect of risk assessment is its heavy reliance on overly conservative assumptions.³⁸ The use of a conservative or non-conservative assumption certainly involves some level of policy judgment and casts doubts upon the existence of the risk assessment/risk management dichotomy.³⁹ Nevertheless, the *Red Book's* separation of risk assessment and risk management appears throughout regulatory programs⁴⁰ and,

31. Elaine M. Faustman & Gilbert S. Omenn, *Risk Assessment*, in CASARETT AND DOULL'S TOXICOLOGY: THE BASIC SCIENCE OF POISONS 75 (5th ed. 1996).

32. RED BOOK, *supra* note 28, at 19-20.

33. *Id.* at 18-19.

34. *Id.* at 19-20.

35. *Id.* at 18-19.

36. Celia Campbell-Mohn & John S. Applegate, *Learning from NEPA: Guidelines for Responsible Risk Legislation*, 23 HARV. ENVTL. L. REV. 93, 97 (1999); Ruckleshaus, *supra* note 14, at 157.

37. RED BOOK, *supra* note 28, at 14-15.

38. Utilization of conservative assumptions at data gaps constitutes a policy decision aiming to assuage public fears over the inherent variability and uncertainties of quantifying the unknown. Campbell-Mohn & Applegate, *supra* note 36, at 102. For criticism of the use of conservative assumptions, see Adam M. Finkel, *A Second Opinion on an Environmental Misdiagnosis: The Risky Prescriptions of Breaking the Vicious Circle*, 3 N.Y.U. ENVTL. L.J. 295, 333 (1995) and Shere, *supra* note 13, at 470.

39. Campbell-Mohn & Applegate, *supra* note 36, at 97-98.

40. John S. Applegate, *Risk Assessment, Redevelopment, and Environmental Justice: Evaluating the Brownfields Bargain*, 13 J. ENERGY, NAT. RESOURCES & ENVTL. L. 243, 255 (1998).

at the least, “discloses the location of policy judgments throughout the assessment-management process.”⁴¹

2. *The Development of Risk Assessment Methodology under CERCLA*

The publication of the *Red Book* and its subsequent adoption by the White House⁴² permitted the EPA to better address an important charge of the 1980’s landmark CERCLA legislation: the requirement demanding that remedial actions be “protective of human health and the environment.”⁴³ To meet this mandate, the EPA’s Office of Emergency and Remedial Response adopted a series of guidelines, manuals, and procedures,⁴⁴ culminating in the 1989 publication of *Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual*.⁴⁵ Although designed for use during the remedial investigation/feasibility study stage of a CERCLA site cleanup, the *RAGS* framework, derived primarily from the *Red Book*, laid the foundation for all environmental risk assessment regimes.⁴⁶

B. Judicial Affirmation of Risk Assessment Techniques

As previously stated, the United States Supreme Court’s decision in *Industrial Union* established risk assessment as a legally acceptable administrative tool to protect human health from potentially toxic compounds.⁴⁷ Subsequently, the D.C. Circuit strengthened this foundation through its decisions in *Public Citizen Health Research Group v. Tyson*⁴⁸ and *Natural Resources De-*

41. Campbell-Mohn & Applegate, *supra* note 36, at 98.

42. The Office of Science and Technology formally adopted the *Red Book*’s framework in 1985. CRS REPORT FOR CONGRESS, *supra* note 22.

43. 42 U.S.C. § 9621(b)(1) (2000).

44. See RAGS PART A, *supra* note 30.

45. RAGS Volume I consists of Parts A through E, available at <http://www.epa.gov/oswer/riskassessment/ragsa/index.htm> (last updated Oct 5, 2006) (RAGS Part A); <http://www.epa.gov/oswer/riskassessment/ragsb/index.htm> (last updated Oct 5, 2006) (RAGS Part B); <http://www.epa.gov/oswer/riskassessment/ragsc/index.htm> (last updated Oct 5, 2006) (RAGS Part C); <http://www.epa.gov/oswer/riskassessment/ragsd/index.htm> (last updated Aug 22, 2006) (RAGS Part D); <http://www.epa.gov/oswer/riskassessment/ragse/index.htm> (last updated Aug 22, 2006) (RAGS Part E).

46. Lorenz R. Rhomberg, *A Survey of Methods for Chemical Health Risk Assessment Among Federal Regulatory Agencies*, 3 HUM. & ECOLOGICAL RISK ASSESSMENT 1029, 1085 (1997).

47. *Industrial Union Dept., AFL-CIO v. American Petroleum Institute*, 448 U.S. 607 (1980).

48. 796 F.2d 1479 (D.C. Cir. 1986).

fense Council v. EPA.⁴⁹ Taken as a whole, these three cases provided an enthusiastic judicial affirmation of quantitative risk assessment principles.⁵⁰

1. *Industrial Union v. American Petroleum Institute*

As noted in Section II.A., many of the federal agencies charged with identifying chemical carcinogens in the late 1970s disagreed as to the appropriate procedures for completing this task. To wit, the EPA and the FDA believed in the development of quantitative assessment of chemical risks based upon human epidemiological and animal laboratory studies, whereas OSHA used these same studies to arrive at a qualitative assessment of risk.⁵¹ Decided in a five-to-four vote generating five opinions and a plurality opinion authored by Justice Stevens, *Industrial Union* ended the controversy by falling squarely on the side of quantitative estimation of risk.⁵²

Industrial Union concerned OSHA's promulgation of standards regulating the occupational exposure of workers to benzene, a known human carcinogen.⁵³ Under section 3(8) of the Occupational Safety and Health Act of 1970, OSHA bore the responsibility of promulgating a standard "reasonably necessary or appropriate to provide safe or healthful employment and places of employment."⁵⁴ As it pertains to toxic compounds, section 6(b)(5) of the Act stated that these standards should "most adequately assur[e], to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity" of exposure to such a compound.⁵⁵ As such, and in accordance with OSHA's adopted policy that no safe level of exposure to carcinogens exists in the absence of irrefutable proof,⁵⁶ OSHA adopted an occupational benzene standard of one part per million (ppm).⁵⁷

In response, benzene producers challenged OSHA's methodology in selecting the one ppm standard. Specifically, the benzene industry argued that a demonstration of carcinogenicity did not cre-

49. 824 F.2d 1146 (D.C. Cir. 1987) (en banc).

50. Shere, *supra* note 13, at 428.

51. *Id.* at 422.

52. *Id.* at 420-21 (stating that *Industrial Union* "provided risk assessment with a solid legal foundation and largely ended administrative resistance to the practice.").

53. *Industrial Union*, 448 U.S. at 611.

54. 29 U.S.C. § 652(8) (2000).

55. *Id.* § 655(b)(5).

56. *Industrial Union*, 448 U.S. at 630. For a discussion of the carcinogenic mechanism, see Section II.C.1.

57. *Id.* at 626.

ate a sufficient basis for promulgating the most stringent benzene limitations technologically and was not economically feasible.⁵⁸ In finding for the benzene industry, the Court declared that OSHA must first make the threshold determination that it is reasonable and appropriate to remedy a significant occupational risk and, only then, would it be necessary to select the most protective remedy pursuant to section 6(b)(5).⁵⁹ Reiterating that “safe” does not equate to “risk-free,” Justice Stevens held that, prior to promulgation of safety standards, OSHA must demonstrate that a workplace is “unsafe — in the sense that *significant risks* are present and can be eliminated or lessened by a change in practices.”⁶⁰

Fortunately for risk assessment proponents, Justice Stevens did not stop at interpreting the Act to impose a “significant risk” proponent, but continued, essentially supporting the quantification of risk. Specifically, the plurality opinion stated that one in a billion odds of a fatality would likely fall outside of what should be considered significant, whereas a reasonable person would likely consider one in a thousand odds of a fatality significant.⁶¹ Although not creating a “mathematical straightjacket,”⁶² the opinion strongly supported utilization of risk assessment to determine the significance of risk.⁶³

2. *Public Citizen Health Research Group v. Tyson*

As demonstrated by *Tyson*, after *Industrial Union*, OSHA altered the methods by which it promulgated occupational exposure levels. *Tyson* involved a challenge to OSHA’s adoption of a one ppm standard for the carcinogenic industrial compound ethylene oxide.⁶⁴ However, this time around, OSHA satisfied section 3(8) of the Act by demonstrating the potential carcinogenicity of ethylene

58. *Id.* at 639.

59. *Id.*

60. *Id.* at 642 (emphasis added).

61. *Id.* at 655. Some risks are plainly acceptable and others are plainly unacceptable. If, for example, the odds are one in a billion that a person will die from cancer by taking a drink of chlorinated water, the risk clearly could not be considered significant. On the other hand, if the odds are one in a thousand that regular inhalation of gasoline vapors that are 2% benzene will be fatal, a reasonable person might well consider the risk significant and take appropriate steps to decrease or eliminate it. Although the Agency has no duty to calculate the exact probability of harm, it does have an obligation to find that a significant risk is present before it can characterize a place of employment as “unsafe.” *Id.*

62. *Id.* In lending support to what later was argued by industry as a weakness of risk assessment, the Court stated that “the Agency is free to use conservative assumptions in interpreting the data.” *Id.*

63. Shere, *supra* note 13, at 420 (citing NAT’L RESEARCH COUNCIL, NAT’L ACAD. OF SCIENCES, SCIENCE AND JUDGMENT IN RISK ASSESSMENT 33 (1995)).

64. *Public Citizen Health Research Group v. Tyson*, 796 F.2d at 1482-83 (D.C. Cir. 1986).

oxide at concentrations lower than the then-current standard of 50 ppm through epidemiological and laboratory studies.⁶⁵ OSHA then quantified the significance of the risk at low levels of exposure through the utilization of a mathematical model incorporating conservative inputs and assumptions.⁶⁶

Referring to OSHA's approach as "thorough and professional,"⁶⁷ the D.C. Circuit stated that OSHA met its burden under the Act and "has done exactly what the Supreme Court chastised the agency for not doing in [*Industrial Union*]."⁶⁸ As such, any doubts as to the judiciary's support for an administrative agency's utilization of quantitative risk assessment following *Industrial Union* likely vanished with the emphatic language of *Tyson*.⁶⁹

3. *Natural Resources Defense Council v. EPA*

Demonstrating that the judicial affirmation of risk assessment did not exclusively attach to OSHA and its obligations, *Natural Resources Defense Council v. EPA* concerned a challenge to the EPA's regulation of vinyl chloride, a known carcinogen, under the Clean Air Act.⁷⁰ Like CERCLA, the Clean Air Act demanded that the EPA set emission standards at levels "provid[ing] an ample margin of safety to protect the public health."⁷¹ Citing the drastic economic repercussions of setting a zero-emission standard, the EPA adopted a vinyl chloride standard that required reductions of vinyl chloride to the lowest level achievable through the use of the best available control technology.⁷² In contrast, the National Resource Defense Council argued that the statute only considers health and any attempt to include economic or technical considerations violates the legislative intent.⁷³ Accordingly, the NRDC claimed that when the data failed to identify a concentration at which no harm will occur, the statute demanded that the EPA adopt a zero-emission standard.⁷⁴

In reasoning mirroring that of the Supreme Court in *Industrial Union*, the court found that the EPA maintained limited discretion in promulgating these standards as the statute specified that the

65. *Id.* at 1489-96.

66. *Id.* at 1496-1500.

67. *Id.* at 1503.

68. *Id.* at 1499. "The agency has gone to great lengths to calculate, within the bounds of available scientific data, the significance of the risk presented by [ethylene oxide]." *Id.*

69. *Shere*, *supra* note 13, at 426.

70. *Natural Res. Def. Council v. EPA*, 824 F.2d 1146, 1148 (D.C. Cir. 1987) (en banc).

71. 42 U.S.C. § 7412(d)(9) (2000).

72. *Natural Res. Def. Council*, 824 F.2d at 1149-50.

73. *Id.* at 1152-55.

74. *Id.* at 1152.

standard must provide “an ample margin of safety.”⁷⁵ In support, the court referenced Justice Stevens’ statement in *Industrial Union* that safe does not mean “risk-free” as an additional source of the EPA’s discretion.⁷⁶ Nonetheless, where uncertainty exists as to the health risks of a compound, the EPA could not “substitute technological feasibility for health as the primary consideration” under the Clean Air Act.⁷⁷ Rather, the statutory mandate to provide safety and protect public health demands that the EPA make a threshold determination of what level should be considered safe—a determination founded exclusively on the “risk to health at a particular emission level.”⁷⁸ Furthermore, the court stated that Congress recognized the innate uncertainties involved in such a determination, hence Congressional inclusion of the “ample margin of safety” language which permits the EPA to “account for inherent limitations of risk assessment and the limited scientific knowledge” of carcinogenic compounds.⁷⁹

C. Theories of Toxicity

As observed in the preceding case law, discussions of chemical toxicity typically concern cancer, and with good cause, due to the scientific community’s focus upon finding a cure⁸⁰ and the heavily publicized tobacco litigation over the past ten years. However, a broad range of chemicals exist that cause death or deleterious health effects by means other than cancer.⁸¹ Unfortunately, the mechanisms by which these noncarcinogens affect human health differ considerably from that of carcinogenic compounds and, as such, quantification of potential carcinogenic and noncarcinogenic risk follows separate mathematical/toxicological pathways. When elucidating what exactly a risk assessment means, one of the most difficult tasks of any public health specialist or toxicologist is explaining the two mechanisms of toxicity: car-

75. *Id.* (citations omitted).

76. *Id.* at 1153.

77. *Id.* at 1164.

78. *Id.*

79. *Id.* at 1165.

80. ROBERT L. GLICKSMAN ET AL., ENVIRONMENTAL PROTECTION: LAW AND POLICY 659 (4th ed. 2003).

81. It should be noted that chemicals often have carcinogenic and noncarcinogenic health effects. For example, depending upon the dose and the exposure level (acute or chronic), arsenic may produce such noncarcinogenic effects as cardiac arrhythmia, degeneration of peripheral and central nervous systems, and cirrhosis of the liver. However, due to its predilection for skin cells, chronic exposure to arsenic is believed to cause two forms of skin cancer, basal cell and squamous cell carcinoma. Robert A. Goyer, *Toxic Effects of Metals*, in CASARETT AND DOULL’S TOXICOLOGY: THE BASIC SCIENCE OF POISONS 696-98 (Curtis D. Klaasen ed., 5th ed. 1996).

cinogenic and noncarcinogenic. Nevertheless, because human health risk assessment differentiates between the two and environmental programs regulate based on the potential toxicological effects, it is crucial to realize the differences between the carcinogens and noncarcinogens. The following subsections attempt to explain carcinogenic and noncarcinogenic health effects.

1. Carcinogens

As discussed in *Industrial Union*,⁸² *Tyson*,⁸³ and *NRDC*,⁸⁴ no threshold concentration, a point at which no adverse health effects occur, exists for carcinogens.⁸⁵ That is, a carcinogen at any concentration, no matter how low, is believed to have the *potential* to cause cancer.⁸⁶ To truly grasp the no-threshold concept, it is necessary to understand that, boiled down to its most simple definition, cancer is nothing more than uncontrolled cell growth.⁸⁷ This unchecked cellular growth results from a solitary molecular event in a single cell.⁸⁸ Accordingly, even a small dose may elicit cancerous growth.⁸⁹

Therefore, a carcinogenic risk estimate equates to the probability that a chemical compound will elicit a carcinogenic effect. As such, safety is nothing more than that level of cancer risk (i.e., probability) which can be deemed insignificant.⁹⁰ So, what level constitutes an insignificant risk? Over the years, the EPA identified one-in-a-million (1×10^{-6}) as an acceptable lifetime excess cancer risk, where lifetime excess cancers are those occurring beyond the baseline cancer rate for the unexposed population or those uniquely attributable to exposure to that compound.⁹¹ However, in the 1980s, conceding that a discrete target risk “implied an unreal-

82. *Industrial Union*, 448 U.S. at 630.

83. *Tyson*, 796 F.2d at 1498.

84. *Natural Res. Def. Council*, 824 F.2d at 1148.

85. For a more exhaustive discussion of the absence of effects threshold theory, see FRANK B. CROSS, ENVIRONMENTALLY INDUCED CANCER AND THE LAW: RISKS, REGULATION, AND VICTIM COMPENSATION 14-16 (1989).

86. RAGS PART A, *supra* note 30, at 7-11.

87. *Id.*; see Henry C. Pitot III & Yvonne P. Dragan, *Chemical Carcinogenesis*, in CASARETT AND DOULL'S TOXICOLOGY: THE BASIC SCIENCE OF POISONS 201, 201 (Curtis D. Klaasen ed., 5th ed. 1996).

88. RAGS PART A, *supra* note 30, at 7-11. Of course, this solitary molecular event can take many different forms and may occur in any of a variety of cells, locations within the cell, or different periods of cellular development and growth. See generally Pitot & Dragan, *supra* note 87, at 201-67.

89. See CTL TECHNICAL REPORT, *supra* note 4, at 8.

90. *Id.*

91. See RAGS PART A, *supra* note 30, at 8-6.

istic degree of scientific precision,”⁹² the EPA began utilizing an acceptable risk range of 1×10^{-6} to one-in-ten thousand (1×10^{-4}).⁹³ For example, exposure to arsenic at a CERCLA site resulting in a lifetime excess cancer risk of one-in-ten million (1×10^{-7}) would be deemed insignificant. However, a lifetime excess cancer risk of two-in-a-million (2×10^{-6}) would constitute a significant risk.

Of course, certain carcinogens are more likely than others to elicit such effects. The metric used to estimate a compound’s carcinogenicity is the cancer slope factor (CSF).⁹⁴ As discussed in *RAGS*, the CSF “defines quantitatively the relationship between [the] dose and response” and represents a “plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime.”⁹⁵ Although the procedures used to calculate CSFs extend beyond the scope of this Note,⁹⁶ identifying and assessing health effects at low exposure levels (especially those levels expected for human contact in the environment) in epidemiological or laboratory studies is a difficult task.⁹⁷ Therefore, CSF development typically entails low-dose extrapolation of data generated from high-dose laboratory studies to arrive at a CSF.⁹⁸

2. Noncarcinogens

In direct contrast to carcinogens, noncarcinogens are assumed to have a dose threshold⁹⁹ and target a specific organ or organ system.¹⁰⁰ Stated more simply, at lower concentrations, noncarcinogens are not expected to produce adverse health effects; however, as the exposure increases, at some specific concentration, adverse health effects will occur. In fact, many compounds elicit multiple noncarcinogenic effects, each with its own threshold.¹⁰¹

Why the difference between carcinogens and noncarcinogens? As the previous section explained the mechanism behind carcinogenesis, perhaps the best means of understanding non-cancer mechanisms is through example. Basically, the threshold concept theorizes that a chemical will not elicit a manifest effect until cer-

92. Adam Babich, *Too Much Science in Environmental Law*, 28 COLUM. J. ENVTL. L. 119, 152-53 (2003).

93. *Id.* at 153.

94. See generally RAGS PART A, *supra* note 30, at 7-11.

95. *Id.*

96. See RAGS PART A, *supra* note 30, at 7-11 to 7-13, for an exhaustive discussion of CSF calculation methodology.

97. See RAGS PART A, *supra* note 30, at 7-11.

98. CTL TECHNICAL REPORT, *supra* note 4, at 8.

99. *Id.* at 9.

100. See generally Pitot & Dragan, *supra* note 87, at 201.

101. CTL TECHNICAL REPORT, *supra* note 4, at 9.

tain protective mechanisms fail.¹⁰² For example, enzymes located in nerve synapses control the transmittal of nerve impulses by regulating the flow of chloride and calcium ions across neuronal membranes. In the simplest form, one enzyme will control ion uptake and one will control ion release. However, the pesticide dieldrin inhibits the enzyme responsible for uptake of free calcium ions in the neuron, resulting in uncontrolled stimulation of the central nervous system, hence seizures. This inhibition only takes place when enough dieldrin is present in the body to overwhelm the uptake enzyme. Therefore, at lower concentrations, dieldrin will have no effect, but eventually its concentration would overwhelm the body's ability to control nerve impulses.¹⁰³

Functionally analogous to CSFs for carcinogenic compounds, a reference dose (RfD) is a toxicity value assigned to noncarcinogenic compounds and used to estimate potential noncarcinogenic human health effects.¹⁰⁴ As previously noted, a chemical may elicit multiple deleterious effects, each with its own threshold. Therefore, an RfD represents the dose at which the most sensitive effect will not occur in the most susceptible individual.¹⁰⁵ Furthermore, each route of exposure (i.e., ingestion, dermal contact, or inhalation) has its own specific reference dose.¹⁰⁶

Unlike carcinogens, an effect probability is not calculated because of the threshold nature of noncarcinogens.¹⁰⁷ Rather, we assume that if the intake (i.e., dose) is greater than the RfD, an adverse health effect will result. If the intake is less than the RfD, no adverse health effect will occur. Simply put, a "yes" or "no" answer exists. Whereas excess cancer risk constitutes the metric used to estimate carcinogenic risk, a hazard quotient, the intake divided by the RfD, is used to measure noncarcinogenic risk.¹⁰⁸

III. HAZARDOUS WASTE REMEDIATION IN FLORIDA

102. RAGS PART A, *supra* note 30, at 7-6.

103. See Donald J. Ecobichon, *Toxic Effects of Pesticides*, in CASARETT AND DOULL'S TOXICOLOGY: THE BASIC SCIENCE OF POISONS 643, 653 (Curtis D. Klaasen ed., 5th ed. 1996). See *id.* at 650, tbl. 22-6.

104. RAGS PART A, *supra* note 30, at 7-5.

105. CTL TECHNICAL REPORT, *supra* note 4, at 9.

106. *Id.* Although beyond the scope of this discussion, other forms of RfDs exist based upon the chemical's critical effect (e.g., developmental) or the length of exposure (e.g., chronic and subchronic). While mandating the use of route-specific RfDs, the risk assessment procedures utilized in Florida feature only the most sensitive RfD. They are based upon the no-observed-adverse-effect level (NOAEL), rather than RfDs based upon critical effect or length of exposure. *Id.* For a discussion regarding the various forms of RfDs, see RAGS PART A, *supra* note 30, at 7-5 to 7-9.

107. RAGS PART A, *supra* note 30, at 8-11.

108. *Id.*

Due to its universal application, Global RBCA changed the face of Florida environmental law—at least as far as contaminated site remediation is concerned. However, in order to understand where Florida environmental law is going it is important to know where it has been. Accordingly, the following subsections explain the traditional regulatory programs utilized in Florida and discuss the contaminant cleanup target level (CTL) concept implemented by Chapter 62-777.

It should be noted that this Note focuses on risk-based regulations as applied to soils, rather than groundwater. This biased focus is not meant to belittle the importance of groundwater contamination or its regulation. Soils, groundwater, and surface water fall within the ambit of Global RBCA. However, because the Federal Safe Drinking Water Act¹⁰⁹ established maximum contaminant levels (MCLs) for groundwater contaminants, Chapter 62-777 simply incorporated the federal standards for those contaminants which the Act regulated. Although MCLs are based upon a contaminant's potential human health effects,¹¹⁰ groundwater and surface water CTLs developed for those contaminants for which no MCL exists may be based on potential human health effects or aesthetic factors.¹¹¹ Nevertheless, because of the extensive federal regulatory overlay vis-à-vis groundwater, state regulatory regimes such as Global RBCA are less influential in regard to groundwater concerns than soil concerns. Therefore, Global RBCA's influence, at least in regard to creating potential remedial liability, is more likely to be felt in the realm of soil remediation.¹¹²

A. The Traditional Regulatory Structure in Florida

Excluding CERCLA remediation projects falling entirely under the auspices of federal authority, hazardous waste sites in Florida were traditionally managed under three regulatory schemes: the Risk-Based Corrective Action program (which applied only to petroleum, dry-cleaning, and brownfield sites), the state-implemented Resource Conservation and Recovery Act (RCRA) program, and the Contamination Assessment Plan/Remedial Action Plan (CAP/RAP) process.

1. The Risk-Based Corrective Action Program

109. 42 U.S.C. § 300—300j-26 (2000). For a thorough discussion of the Federal Safe Drinking Water Act, see GLICKSMAN, *supra* note 80, at 744-53.

110. 42 U.S.C. § 300g-1(b)(3)(C)(i) (2000).

111. CTL TECHNICAL REPORT, *supra* note 4, at 7.

112. However, it should be noted that Global RBCA creates significant flexibility in remediating impacted groundwater via natural attenuation.

Accounting for more than 90 percent of contaminated sites in Florida, petroleum,¹¹³ dry-cleaning,¹¹⁴ and brownfield¹¹⁵ sites constitute the bulk of Florida's regulatory concern.¹¹⁶ Aware of the issue, the FDEP first promulgated rules instituting risk-based corrective action principles for petroleum sites in 1996.¹¹⁷ Shortly thereafter, the Legislature authorized utilization of risk-based corrective action for brownfields sites in 1997¹¹⁸ and sites contaminated by dry-cleaning operations in 1998.¹¹⁹ Together, petroleum-contaminated sites, dry-cleaner solvent contaminated sites, and brownfields are referred to as program sites.¹²⁰

Chapter 62-777 and, more correctly, its associated guidance, the *CTL Technical Report*, provide the risk methodology for Florida's risk-based corrective action program. Regulations governing program sites incorporated Chapter 62-777 by reference¹²¹ and, as originally promulgated in 1999, Chapter 62-777 established that it only applied to program sites.¹²² Discussed in greater detail in Section III.B.3., the RBCA program utilizes a three-tiered approach to risk assessment, with each tier demanding a more detailed and thorough assessment of risk.¹²³

2. The RCRA Program

113. FLA. STAT. § 376.303 (2005) (establishing a program to regulate petroleum storage tanks); FLA. ADMIN. CODE ANN. r. 62-770 (2005) (establishing criteria for a rehabilitation program for petroleum sites and incorporating Chapter 62-777).

114. FLA. STAT. § 376.3078 (2005) (establishing a state-funded program to cleanup those properties contaminated due to drycleaning operations); FLA. ADMIN. CODE ANN. r. 62-782 (2005) (establishing criteria for a rehabilitation program and incorporating Chapter 62-777).

115. FLA. STAT. § 376.77, 376.85 (2005) (known as the Brownfields Redevelopment Act); FLA. ADMIN. CODE ANN. r. 62-7852 (2005) (establishes cleanup criteria for designated brownfield sites and incorporates Chapter 62-777).

116. FLA. DEPT OF ENVTL. PROT., FINAL STATEMENT OF ESTIMATED REGULATORY COST FOR PROPOSED REVISIONS TO: CHAPTER 62-777, F.A.C., "CONTAMINANT TARGET CLEANUP LEVELS" (Dec. 23, 2004), *available at* http://www.dep.state.fl.us/waste/quick_topics/publications/wc/ERCAAdoptionHearing020205/SERC/777FinalSERC12-23-04.pdf (last visited Nov. 16, 2006).

117. CONTAMINATED SOILS FORUM, POLICY SUB-COMMITTEE FOCUS GROUP ON NEED FOR UNIFORM POLICY, *available at* http://www.dep.state.fl.us/waste/quick_topics/publications/wc/csf/focus/cufg_gs.pdf (last visited Nov. 16, 2006).

118. FLA. STAT. § 376.77 (2005).

119. FLA. STAT. § 376.3078 (2005).

120. *Id.*

121. *See* FLA. ADMIN. CODE ANN. r. 62-770 (2005) (Petroleum Rule); FLA. ADMIN. CODE ANN. r. 62-782 (Drycleaning Rule); FLA. ADMIN. CODE ANN. r. 62-785 (Brownfields Rule).

122. Memorandum from John M. Ruddell, Director, Division of Waste Management to Directors of District Management, Waste Program Administrators (Sept. 29, 2000), *available at* http://www.dep.state.fl.us/waste/quick_topics/publications/documents/soilcleanup.pdf [hereinafter Ruddell].

123. *See infra* Section III.B.3.

In contrast to CERCLA remediation sites, RCRA cleanup sites are not regulated under a comprehensive federal corrective action regime; RCRA cleanup sites are regulated on a case-by-case basis.¹²⁴ However, following a thorough evaluation of the state regulatory scheme to ensure compliance with federal guidelines, the EPA may delegate regulatory authority under RCRA to individual states.¹²⁵ The EPA granted Florida authority to implement the RCRA hazardous waste program in 1985.¹²⁶ As a result, the FDEP regulates RCRA sites in the same manner as program sites through the implementation of the risk-based requirements established by Chapter 62-777.¹²⁷

3. *The CAP/RAP Process*

Prior to the promulgation of rules implementing Global RBCA, the FDEP managed those contaminated sites not recognized as program sites or regulated pursuant to RCRA under the CAP/RAP process.¹²⁸ The FDEP guidance document *Model Corrective Actions for Contaminated Site Cases (CACSC)* provided the structure for investigation and remediation of these contaminated sites.¹²⁹ Specifically, the *CACSC* recommended procedures for the development and approval of work plans and reports and included remediation criteria based upon applicable groundwater and surface water standards, groundwater guidance concentrations,

124. Philip E. Karmel, *Achieving Radical Reductions in Cleanup Costs*, 487 PRACTISING L. INST., REAL EST. L. AND PRAC. COURSE HANDBOOK SERIES 315, 348 (2002).

125. 43 U.S.C. § 6926(b) (2000).

126. 50 Fed. Reg. 3908 (Jan. 29, 1985). Of course, the states must maintain a program equivalent to and as stringent as the federal program. Therefore, when the EPA amends the federal regulations, states must also amend their programs. As such, the EPA granted subsequent authorizations for the amendment of the Florida RCRA program in 1987. 52 Fed. Reg. 45,634 (Dec. 1, 1987); 53 Fed. Reg. 50,529 (Dec. 16, 1988), 55 Fed. Reg. 5141 (Dec. 14, 1990); 57 Fed. Reg. 4371 (Feb. 5, 1992), 57 Fed. Reg. 4738 (Feb. 7, 1992), 57 Fed. Reg. 21,351 (May 20, 1992); 58 Fed. Reg. 59,367 (Nov. 9, 1993); 59 Fed. Reg. 35,266 (July 11, 1994); 59 Fed. Reg. 41,979 (Aug. 16, 1994); 59 Fed. Reg. 53,753 (Oct. 26, 1994); 62 Fed. Reg. 15,407 (Apr. 1, 1997); 66 Fed. Reg. 44,307 (Aug. 23, 2001); 67 Fed. Reg. 53,886; 67 Fed. Reg. 53,889 (Aug. 20, 2002); 69 Fed. Reg. 60,964 (Oct. 14, 2004). Furthermore, and of more immediate concern, the EPA granted corrective action authority in 2000. 65 Fed. Reg. 56,256 (Sept. 18, 2000).

127. Memorandum from John M. Ruddell, Director, Division of Waste Management to Directors of District Management (Aug. 21, 2002) (on file with author).

128. Interestingly, coinciding with the FDEP's promulgation of Chapter 62-780, the Fifth District Court of Appeal declared in *Kerper v. Department of Environmental Protection*, 894 So.2d 1006, 1009 (Fla. 5th DCA 2005), that due to the prescriptive nature of the mandates contained in the *Corrective Actions for Contaminated Site Cases (CACSC)*, the *CACSC* requires compliance and, therefore, could only be adopted through formal rulemaking procedures.

129. FLA. DEPT OF ENVTL. PROT., CORRECTIVE ACTIONS FOR CONTAMINATED SITE CASES (1999), <http://www.dep.state.fl.us/legal/Enforcement/appendix/models/correct.pdf>.

chemical leachability factors, and soils exposure guidelines.¹³⁰ However, as noted in staff analyses for the Global RBCA bill, the “CAP/RAP process has always incorporated general notions of risk-based cleanup but without the clear direction and authority provided by the statute for the three true RBCA programs.”¹³¹

Nevertheless, with the promulgation of rules implementing Global RBCA and the Fifth District’s determination in *Kerper v. Florida Department of Environmental Protection*¹³² that the CACSC constituted an unpromulgated and invalid rule,¹³³ the statutorily-mandated rules established by Global RBCA replaced the procedures demanded under the CAP/RAP process.

B. Risk-Based Corrective Action under Chapter 62-777

Originally published in 1999,¹³⁴ the *CTL Technical Report* fleshes out the risk-based procedures utilized in Florida for the assessment of program sites and now, thanks to Global RBCA, all non-federally regulated contaminated sites within the state.¹³⁵ Although based upon the traditional risk assessment procedures detailed in *RAGS*, the risk-based procedures of Chapter 62-777, as developed by the *CTL Technical Report*, attack remediation of contaminated sites from a different angle. The *CTL Technical Report* establishes default CTLs and the methodology used to calculate alternative CTLs for restricted use sites, both of which are discussed in Section III.B.2.

1. Brief Introduction to Risk Calculation

As previously noted, risk is the product of an organism’s exposure to a particular contaminant and that contaminant’s toxicity.¹³⁶ Accordingly, a risk assessment seeks to quantify an individual’s exposure to a contaminant and multiply that value by a scientifically supportable toxicity value. However, where are these

130. See generally *id.*

131. Fla. H.R. Comm. on Nat. Resources., HB 1123 (2003) (Staff Analysis 1 on Mar. 21, 2003).

132. 894 So.2d 1006, 1009 (Fla. 5th DCA 2005).

133. *Id.* at 1009. In *Kerper*, the Fifth District held that, due to the prescriptive nature of the mandates contained in the CACSC, the CACSC requires compliance and, therefore, could only be adopted through formal rulemaking procedures. *Id.* Moreover, the court cited the legislative staff analysis language as a clear demonstration that rules did not exist for non-program sites even though Chapter 376 directed the FDEP to adopt rules for “removal or disposal standard.” *Id.* at 1010.

134. SARANKO, *supra* note 4.

135. The CTL TECHNICAL REPORT was revised and republished in February 2005. See CTL TECHNICAL REPORT, *supra* note 4.

136. See *supra* Section II.A.1.

formulae and values found? The following subsections provide a cursory discussion of the basic formula and inputs necessary to calculate a risk estimate. The intent of this section is to provide a basic understanding of the CTL approach utilized by the FDEP and should, by no means, be interpreted as a thorough evaluation of risk assessment principles or methodology.¹³⁷

a. Quantification of Exposure

Exposure to contaminants present in the environment occurs by a variety of routes such as contact with contaminated soil, inhalation of contaminated dust particles, or incidental ingestion of contaminated soil. Essentially, a risk assessment attempts to measure an individual's contact with a contaminant. To this end, RAGS contains formulae for various exposure routes that rely upon an assortment of exposure parameters.¹³⁸ Exposure parameters may be as simple as an estimate of an individual's time spent at work on a daily basis or as complex as the volume of air an individual inhales on an hourly basis. Peer-reviewed literature, most notably secondary sources such as the EPA's *Exposure Factors Handbook*,¹³⁹ the Agency for Toxic Substances and Disease Registry, state agencies, and other organizations provide estimates for seemingly any exposure parameter imaginable.¹⁴⁰ The *CTL Technical Report* simplifies the process by adopting default exposure parameters for residential or non-residential exposure scenarios.¹⁴¹

Of course, it would be impossible to calculate an individual's exposure to a contaminant without knowing the concentration of that contaminant in the environment. Accordingly, analytical data for soil, groundwater, sediment, and surface water samples collected at a site are used to estimate the exposure point concentration (EPC); the contaminant concentration to which an individual will be exposed. Calculating EPCs may involve the use of sophisticated modeling techniques, advanced statistical evaluations, or merely

137. See generally RAGS PART A, *supra* note 30.

138. See RAGS PART A, *supra* note 30, at 6-35 to 6-46.

139. NAT'L CTR. FOR ENVTL. ASSESSMENT, U.S. ENVTL. PROT. AGENCY, EXPOSURE FACTORS HANDBOOK (1997).

140. See, e.g., OFFICE OF SUPERFUND REMEDIATION AND TECH. INNOVATION, ENVTL. PROT. AGENCY, RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME I: HUMAN HEALTH EVALUATION MANUAL (PART E, SUPPLEMENTAL GUIDANCE FOR DERMAL RISK ASSESSMENT) (July 2004); OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROT. AGENCY, RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME I: HUMAN HEALTH EVALUATION MANUAL, SUPPLEMENTAL GUIDANCE "STANDARD DEFAULT EXPOSURE FACTORS" (Mar. 25, 1991).

141. See generally CTL TECHNICAL REPORT, *supra* note 4, at 19-29 (discussing the exposure parameters upon which CTLs are based).

the maximum detected concentration depending on the data available or the media under evaluation. Traditionally, the risk assessment community utilized a statistic known as the 95% upper confidence limit (95% UCL) on the mean, a value at least as great as the true mean to a 95% statistical certainty,¹⁴² to describe the EPC.¹⁴³

It should be noted that attempts to estimate exposure to a contaminant and the EPC involve a great deal of uncertainty. The scientific community addresses such uncertainty through the adoption of conservative assumptions that aim to err on the side of caution in regard to public health.¹⁴⁴ For example, the majority of default exposure parameters are derived from the high end, 90th or 95th percentile, of the potential values for a particular parameter.¹⁴⁵ To be sure, these multiple layers of conservatism aim to overstate risk¹⁴⁶ and many critics argue that this multilayer conservatism goes too far. As articulated in his book, *Breaking the Vicious Circle*,¹⁴⁷ Justice Stephen Breyer states that “monumental overestimates of health risk,”¹⁴⁸ based on overly conservative assumptions fuel public concern, subsequently forces “the agency to

142. Many of the statistical concepts used to calculate exposure point concentrations likely extend beyond the scope of the Note. That being said, the concept of a 95% UCL is more easily understood if we recognize that analytical data collected from a hazardous site merely provides a glimpse into that site's true chemical composition. As such, a statistical mean derived from such data is not the true mean, but simply the mean of that dataset. Therefore, the 95% UCL uses the distribution and variance of the data to arrive at a value which, to a 95% statistical certainty, contains the true mean of the site. Accordingly, the 95% UCL will be greater, and many times, depending on the particular dataset, dramatically greater than the mean of the dataset. For a more thorough discussion of the 95% UCL, see OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROT. AGENCY, CALCULATING UPPER CONFIDENCE LIMITS FOR EXPOSURE POINT CONCENTRATIONS AT HAZARDOUS WASTE SITES (2002).

143. *See id.* However, more advanced statistical methods recently began gaining acceptance, particularly in Florida, as the more appropriate means of estimating a site's EPC. CTL TECHNICAL REPORT, *supra* note 4, at 126 (referencing the FLUCL tool). *See also* Mills, C.F. et al., Comparison of Techniques for Calculating 95% Upper Confidence Limits (95% UCLs) on the Mean, 72 TOXICOLOGICAL SCI. (SUPPLEMENT) 395 (2003) (presentation at the March 2003 Annual Society of Toxicology meeting in Salt Lake City, UT); C. J. Saranko et al., The Effects of Using Multiple Contaminant 95% UCLs on Cumulative Risk Estimates, 84 TOXICOLOGICAL SCI. (SUPPLEMENT) 424 (2003) (presentation at the March 2003 Annual Society of Toxicology meeting in Salt Lake City, UT).

144. Shere, *supra* note 13, at 470.

145. CTL TECHNICAL REPORT, *supra* note 4, at 69 (most exposure factors are based upon the “reasonable maximum exposure”); *see also* NAT'L CTR. FOR ENVTL. ASSESSMENT, U.S. ENVTL. PROT. AGENCY, *supra* note 139.

146. Campbell-Mohn & Applegate, *supra* note 36, at 103.

147. *See generally* STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION (Harvard Univ. Press 1993).

148. *Id.* at 47 n.75 (quoting Albert L. Nichols & Richard J. Zeckhauser, *The Perils of Prudence: How Conservative Risk Estimates Distort Regulation*, 10 REGULATION 13, 13 (1986)).

prove it has erred on the side of safety.”¹⁴⁹ Nevertheless, utilization of conservative assumptions at data gaps constitutes a policy decision aiming to assuage public fears over the inherent variability and uncertainty of quantifying the unknown.¹⁵⁰

b. Toxicity Data

As discussed in Section II.C., CSFs and RfDs represent the toxicity of carcinogens and noncarcinogens respectively.¹⁵¹ EPA’s Integrated Risk Information System (IRIS)¹⁵² represents the most complete source of toxicity data available and provides the source of toxicity data incorporated into the majority of state regulatory schemes. In fact, under a CERCLA-regulated risk assessment, information made available on IRIS “supersedes [that from] all other sources” and is continuously updated.¹⁵³ As with most states, Florida utilizes IRIS as the primary source of toxicity values.¹⁵⁴

c. Forward Risk Calculation

RAGS utilizes a forward calculation of risk. That is, the *RAGS* framework arranges the exposure parameters and EPC to solve for a risk estimate. For example, *RAGS* utilizes the following equation to calculate a carcinogenic risk estimate for incidental ingestion of contaminated soils:¹⁵⁵

$$\text{Risk} = \frac{EPC \times IR \times EF \times ED \times CSF}{BW \times AT}$$

Where:

149. BREYER, *supra* note 147, at 50; *see also* Adam M. Finkel, *A Second Opinion on an Environmental Misdiagnosis: The Risky Prescriptions of Breaking the Vicious Circle*, 3 N.Y.U. ENVTL. L. J. 295, 333 (1995).

150. Campbell-Mohn & Applegate, *supra* note 36, at 102.

151. *See supra* Section II.C.

152. Integrated Risk Information System, <http://www.epa.gov/iris/index.html>.

153. *RAGS PART A*, *supra* note 30, at 7-13 to 15. If data does not exist for a particular chemical in IRIS, *RAGS* creates a hierarchy of information sources including the EPA’s Health Effects Assessment Summary Tables (HEAST), other criteria documents such as drinking water health advisories and ambient water quality reports, and toxicological profiles compiled by the Agency for Toxic Substances and Disease Registry (ATSDR). The EPA makes this information available only on-line.

154. The CTL Technical Report contains a similar hierarchy to that of *RAGS*, culling toxicity from the following sources in order of preference: IRIS, provisional toxicity values published by the National Center for Environmental Assessment (NCEA), HEAST, and variety of supplemental sources. CTL TECHNICAL REPORT, *supra* note 4, at 9-10.

155. Modified from *RAGS PART A*, *supra* note 30, at 6-40, 8-6. The formula used to calculate a hazard index for a noncarcinogen would be similar, with the RfD appearing in the denominator and the CSF, of course, being omitted.

Risk = a unit-less probability of an individual developing cancer

EPC = Exposure point concentration (milligrams(mg)/kilogram(kg))

IR = Ingestion rate (mg of soil/day)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

CSF = Cancer slope factor (mg/kg/day)

BW = Body weight (kilograms)

AT = Averaging time (days)

The EPA's *RAGS* provides the regulatory framework for a risk assessment conducted for a CERCLA site. Although the *RAGS* framework permeates the risk assessment landscape and, most certainly, forms the foundation of most, if not all, individual state-created risk-based regulatory schemes, risk-based regulation of contaminated sites may take other forms.

2. Cleanup Target Levels

In many situations and under regulatory regimes other than CERCLA,¹⁵⁶ it may be desirable to calculate a concentration for a particular chemical which is believed to be safe (i.e., at an acceptable level of risk).¹⁵⁷ In such a case, the aforementioned equation is rearranged to solve for the desired target level, the CTL in Florida, and the preferred level of risk is incorporated. In Florida, the FDEP mandates the use of a 1×10^{-6} target risk.¹⁵⁸ This concept forms the basis of Chapter 62-777. The following equation, modified from the forward calculation of carcinogenic risk resulting from incidental ingestion of contaminated soils presented in the previous section, would result:

$$CTL = \frac{BW \times AT \times 1 \times 10^{-6}}{IR \times EF \times ED \times CSF}$$

156. Many other states have adopted similar rules under their regulatory regimes. See, e.g., CORRECTIVE ACTION GROUP, LA. DEP'T OF ENVTL QUALITY, RISK EVALUATION/CORRECTIVE ACTION PROGRAM (RECAP) (2003), available at <http://www.deq.state.la.us/portal/Portals/0/technology/recap/2003/RECAP%202003%20Text%20-%20final.pdf>; MASS. DEP'T OF ENVTL. PROT., GUIDANCE FOR DISPOSAL SITE RISK CHARACTERIZATION - IN SUPPORT OF THE MASSACHUSETTS CONTINGENCY PLAN, INTERIM FINAL POLICY # WSC/ORS-95-141 (1995), available at <http://www.mass.gov/dep/cleanup/laws/rc1.pdf>.

157. The CERCLA methodology for calculating Preliminary Remediation Goals utilizes this scheme. See OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROT. AGENCY, RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME I: HUMAN HEALTH EVALUATION MANUAL (PART B, DEVELOPMENT OF RISK-BASED PRELIMINARY REMEDIATION GOALS) (Oct. 1991).

158. CTL TECHNICAL REPORT, *supra* note 4, at 8.

Where: CTL = Cleanup Target Level (mg/kg)

Through the use of this equation and default exposure parameters, default CTLs for residential and nonresidential (i.e., commercial and industrial) receptors are calculated and presented in the *CTL Technical Report*.¹⁵⁹ However, Global RBCA provides for calculation of alternative CTLs (“ACTLs”) where present and future site use and exposure characteristics differ greatly from those utilized to calculate the default CTLs such that the default CTLs “do not accurately correspond to the risk goals for that site.”¹⁶⁰ In essence, ACTLs seek to present a best estimate of site-specific conditions.

Of course, if the EPC for a site does not exceed the default residential CTLs, no further calculations would be warranted or desired as the site would have met the most stringent requirements. The calculation and use of ACTLs would only be desirable if the EPC for a chemical exceeded the default CTLs for residential use. In such a situation, site-specific exposure parameters are substituted for the defaults to calculate a CTL that better corresponds to actual site conditions.¹⁶¹

3. Florida’s Tiered Approach to Risk-Based Regulation

Conducting a risk assessment is not an inexpensive process. In many instances, use of the conservative, default assumptions produces an acceptable estimate of risk. In such instances, costs would be at the low end of the spectrum. However, in other situations, use of these default assumptions results in an unacceptable estimate of risk. Here, more detailed site-specific data is necessary to calculate a more realistic estimate of potential risk. Unfortunately, more detail entails additional laboratory analyses, field work, and more advanced contaminant modeling—all resulting in greater costs.

As with many states, Florida follows a tiered approach to risk-based corrective action.¹⁶² Under such an approach, “increas-

159. See CTL TECHNICAL REPORT, *supra* note 4, at tbl. II.

160. *Id.* at 43-44.

161. Due to ACTLs heavy utilization of contaminant fate and transport concepts, an exhaustive discussion regarding the calculation of ACTLs is beyond the scope of this Note. Calculation of ACTLs may include alteration of exposure parameters as well as accounting for site-specific soil and wind characteristics. *Id.* at 44-49.

162. FLA. ADMIN. CODE ANN. r. 62-780 (2005) (“This chapter provides a phased risk-based corrective action process that is iterative and that tailors the site rehabilitation tasks to the site-specific conditions and risks.”).

ingly detailed levels of risk assessment” are performed when “more generic assumptions are thought to overstate actual or expected site conditions.”¹⁶³ Although the tiered approach to risk-based corrective action has its critics,¹⁶⁴ it permits an incremental assessment of risk and thereby avoids the substantial expenses of the oftentimes unnecessary, detailed, site-specific risk evaluation.¹⁶⁵

The approach utilized by the FDEP features three tiers, known as Risk Management Options (“RMO”). Under RMO I, the FDEP grants a “No Further Action” (NFA) order if the EPC for all detected chemicals do not exceed the less stringent of their corresponding default residential CTLs or their background concentration.¹⁶⁶ However, if the EPC for any chemical exceeds both of these values, then the site must move to the subsequent tier, RMO II. According to RMO II, the FDEP grants a NFA order, subject to institutional controls, if the EPCs for all detected chemicals do not exceed default commercial/industrial CTLs or ACTLs adjusted for site-specific geologic or hydrogeologic conditions.¹⁶⁷ Finally, under RMO III, the FDEP grants a NFA order, subject to institutional controls, if the EPCs for all detected chemicals do not exceed ACTLs adjusted for site-specific exposure scenarios determined in the exposure assessment.¹⁶⁸

4. Risk-Based Restrictions on Land Use

Under Florida guidance, if the EPCs for contaminants exceed default CTLs, ACTLs based on site-specific exposure parameters may be calculated to account for the expected future use of the site. However, where site-specific exposure parameters are used the FDEP demands that “engineering and/or institutional controls ... would reliably restrict exposure frequency and duration.”¹⁶⁹ Such controls may consist of engineered or non-engineered impediments to exposure. Engineered controls consist of paved parking lots, clean backfilled soil, or clay caps.¹⁷⁰ Non-engineered controls often include deed restrictions, restrictive covenants, or conservation easements, but may include less-preferred methods such

163. Campbell-Mohn & Applegate, *supra* note 36, at 275.

164. *See id.* at 274-75 (presenting a rather cynical and apprehensive view of tiered risk-based approaches).

165. *Id.*

166. FLA. ADMIN. CODE ANN. r. 62-780.680(1) (2005).

167. *Id.* at r. 62-780.680(2) (2005).

168. *Id.* at r. 62-780.680(3) (2005).

169. CTL TECHNICAL GUIDANCE, *supra* note 4, at 44; FLA. ADMIN. CODE ANN. r. 62-780.200(25) (2005) (defining institutional controls).

170. John Pendergrass, *Sustainable Redevelopment of Brownfields: Using Institutional Controls to Protect Public Health*, 29 ENVTL. L. REP. 10,243, 10,243 (1999).

as consent orders and zoning restrictions.¹⁷¹ Nevertheless, employment of an engineered control at a contaminated site necessitates the use of institutional controls to protect the engineered control from human activities.¹⁷² Although discussed further in Section IV.B.2., Florida defines institutional controls as “the restriction on use or access to a site to eliminate or minimize exposure to ... contaminants.”¹⁷³

Global RBCA permits the use of institutional controls only after the FDEP approves the proposed restrictions and the regulated party provides the local government and directly affected adjacent residents and landowners constructive notice and a thirty-day comment period.¹⁷⁴ Furthermore, upon FDEP acceptance of a proposed institutional control such as a restrictive covenant or conservation easement, the agreement must be recorded with the city or county clerk of the local jurisdiction.¹⁷⁵

IV. SECTION 376.30701, *FLORIDA STATUTES*, AND THE GLOBAL RBCA RULE

Section 376.30701, *Florida Statutes* simply demanded that the aforementioned risk-based corrective action principles established by Chapter 62-777 apply to all contaminated sites in the state¹⁷⁶ and authorized the FDEP to establish rules implementing this mandate.¹⁷⁷ In essence, it authorized the FDEP to take the existing regulations in Chapter 62-777 applicable to program sites and apply them to the remainder of Florida’s contaminated sites.

However, as simple as this legislation and the Global RBCA rule may sound, certain provisions deserve a closer examination. Moreover, implementation of risk-based corrective action principles at traditionally non-program sites may create some problem-

171. See generally DIV. OF WASTE MGMT., FLA. DEPT OF ENVTL. PROT., INSTITUTIONAL CONTROLS PROCEDURES GUIDANCE 3-12 (2004), available at http://www.dep.state.fl.us/waste/quick_topics/publications/wc/csfl/icpg.pdf.

172. *Id.* at 6; see also Seth Schofield, *In Search of the Institution in Institutional Controls: The Failure of the Small Business Liability Relief and Brownfields Revitalization Act of 2002 and the Need for Federal Legislation*, 12 N.Y.U. ENVTL. L.J. 946, 974 (2005).

173. FLA. STAT. § 376.301(21), 376.79(10) (2005).

174. FLA. STAT. § 376.30701(2)(d) (2005). Adjacent landowners or residents are granted the ability to comment only if the point of compliance extends through or to their property. *Id.* Although not discussed in this Note, a point of compliance is typically established for monitored natural attenuation of groundwater contaminant plumes. See generally FLA. ADMIN. CODE ANN. r. 62-780.690 (2005) (discussing the requirements for monitored natural attenuation under Global RBCA).

175. DIV. OF WASTE MGMT., FLA. DEPT OF ENVTL. PROT., *supra* note 171 at 15-16.

176. See Fla. H.R. Comm. on Nat. Resources, *supra* note 131, at 4.

177. FLA. STAT. § 376.30701(2) (2005). Although the Global RBCA rule was not adopted until February 3, 2005, the statute mandated that the FDEP establish rules implementing Global RBCA by July 1, 2004.

atic implications. As such, the following subsections discuss, first, the finer elements of the legislation and the rule and, second, the unintended implications of Global RBCA in Florida.

A. *The Substantive Effects of Global RBCA*

With the main thrust of Global RBCA being the implementation of Chapter 62-777 at all contaminated sites, the question quickly turned to: what does Florida consider a “contaminated site.” Evidently, in an effort to avoid the appearance that Global RBCA sought to grant the FDEP additional authority, the Legislature vigorously emphasized that Chapter 376.30701 does “not create or establish any new liability for site rehabilitation.”¹⁷⁸ Accordingly, the Legislature mandated that Global RBCA only applies to those sites “where legal responsibility for site rehabilitation exists pursuant to [chapter 376] or chapter 403.”¹⁷⁹

1. *Offsite Migration and the Notice Provision*

During the consolidated rulemaking process, the Environmental Regulation Commission (ERC), or the executive-appointed board responsible for adopting environmental rules, evaluated over fifty amendments; the amendments were proposed by concerned citizens, environmental organizations, and trade groups to the FDEP’s proposed Global RBCA rule and the existing rules regulating cleanup criteria and program sites.¹⁸⁰ Although many of these proposed amendments dealt with minor housekeeping issues or the program site rules,¹⁸¹ a couple of concerns resulted in the revision of the FDEP’s proposed Global RBCA rule.

178. *Id.* § 376.30701(1)(a) (2005). This language appears as the very first sentence of the statute.

179. *Id.*

180. *ERC Adoption, supra* note 10, at 3.

181. *Id.* Certainly, a couple of these proposed amendments drew attention. Although beyond the scope of this Note, the Legal Environmental Assistance Foundation’s (LEAF) proposed an amendment to Chapter 62-777 that would eliminate the use of a 33% bioavailability factor for arsenic. This was a particularly contentious subject and eventually failed. The culmination of an FDEP-funded study conducted by Dr. Steve Roberts and his staff at the University of Florida, the new bioavailability factor, which substantially increases the concentration of arsenic deemed acceptable in soil, was the subject of extensive debate over the past couple of years by Florida’s Contaminated Soils Forum. *Id.*

In addition to the debate surrounding LEAF’s proposed amendment, the Florida Petroleum Marketers and Convenience Store Association (FPMA) offered three amendments to the Petroleum Rule established by Chapter 62-770. *Id.* Following the ERC’s rejection of these amendments on February 3, 2005, the FPMA filed a formal challenge of the Petroleum Rule alleging an invalid exercise of delegated authority and, ultimately, delaying the adoption of this rule. *Id.*

First, following an August 3, 2004 workshop discussing the consolidated rulemaking, the FDEP elected to scale back the notice provisions written into the proposed Global RBCA rule.¹⁸² Originally, the notice provision demanded that, following discovery of off-site contamination, the responsible party must notify adjacent property owners of the release.¹⁸³ However, opponents of this provision commented that such notice would attract third-party lawsuits and questioned the FDEP's authority to establish new notice provisions.¹⁸⁴ Accordingly, in order to avoid a potential rule challenge, the FDEP modified the final version of the Global RBCA rule originally adopted on February 3, 2005; this required that the responsible party only provide notice to the FDEP and the county health department in which the site is located when the responsible party discovers that contamination has migrated off-site.¹⁸⁵

Second, but also relating to the aforementioned notice provision, many comments focused on the proof necessary to determine that contamination had migrated off-site. Specifically, the proposed Global RBCA rule required that the responsible party provide notice upon a reasonable inference of off-site contaminant migration.¹⁸⁶ However, the FDEP eventually increased this burden of proof by requiring positive analytical data to demonstrate off-site migration.¹⁸⁷

2. *Controversial Technical Issues under Chapter 62-780*

Outside of the procedural realm, many comments expressed concern over two other complex and technical aspects of the proposed Global RBCA rule, both of which remained in the final rule.¹⁸⁸ First, as previously noted, in an effort to reduce costs by

182. Chris Saranko, *FDEP Briefs the ERC on Global RBCA, The Environmental Regulation Commission Adopts Global RBCA*, 26 THE ENVTL. AND LAND USE L. SEC. REP. 1, 1 (2005) [hereinafter ERC Briefing]. In fact, the large volume of public comments received regarding the notice provision resulted in a delay of the subsequent meeting in which the FDEP briefed the ERC on the proposed rule. *Id.*

183. FLA. DEP'T OF ENVTL. PROT., AUGUST 3RD WORKSHOP DRAFT: CONTAMINATED SITE CLEANUP CRITERIA CH. 62-780, F.A.C. 10 (2004) (presented at the Aug. 3, 2004 Rule-making Workshop), available at http://www.dep.state.fl.us/waste/quick_topics/publications/wc/Rule_Workshops/780TextFinalAugust2004Workshop.pdf.

184. Saranko, *supra* note 182, at 1.

185. See FLA. ADMIN. CODE ANN. r. 62-780.220(2) (2005); *ERC Adoption*, *supra* note 10, at 3.

186. *ERC Adoption*, *supra* note 10, at 3.

187. FLA. ADMIN. CODE ANN. r. 62-780.220(2) (2005); *ERC Adoption*, *supra* note 10, at 3.

188. Although briefly discussed in this Section, the 3X "not to exceed" mandate and the apportionment provision exceed the scope of this Note. Both concepts deal with highly technical concepts that underlie the foundations of risk assessment and the target cleanup level concept.

remediating only that contamination which presents unacceptable risk (as long as EPC calculated for a chemical falls below that chemical's CTL) the responsible party may leave soils in place that exceed that CTL.¹⁸⁹ However, Global RBCA added a ceiling to the concentration which may be left in place. Specifically, no chemical detected in soil may exceed three times its appropriate CTL (i.e., residential or industrial) regardless of the institutional controls implemented.¹⁹⁰

Second, the FDEP incorporated a concept known as apportionment into Global RBCA. Apportionment deals with the underlying foundation of Florida's risk-based corrective action program that the target excess cancer risk should not exceed 1×10^{-6} for carcinogens and that the non-carcinogenic risk should not exceed one. Specifically, at a site where multiple chemicals have been detected, the target risk should be "apportioned" amongst the detected chemicals, resulting in dramatically reduced CTLs.

Primarily, opponents of the 3X "not to exceed" mandate and the apportionment provision commented that these requirements undermine many of the technical foundations of risk assessment.¹⁹¹ Furthermore, opponents argue that these provisions create considerable financial obstacles to site remediation and uncertainty in reaching a successful outcome, such that responsible parties may select the substantially more costly route of remediating to default CTLs, rather than leave contaminated soils, contributing little to overall risk, in place.¹⁹²

B. The Problematic Implications of Global RBCA

Practitioners and regulators alike appreciate the uniformity which Global RBCA brings to Florida environmental law.¹⁹³ Nevertheless, the new rule is not without disadvantages. The following subsections present two, under the radar, substantial implications of Global RBCA.

1. The Dawn of New ARARs

189. See *supra* Section III.B.4.

190. See FLA. ADMIN. CODE ANN. r. 62-780.680(1)(b)1.d.(II) (2005); FLA. ADMIN. CODE ANN. r. 62-780.680(2)(b)1.e.(II); FLA. ADMIN. CODE ANN. r. 62-780(3)(b)1.b.

191. Saranko, *supra* note 182, at 2.

192. *Id.*

193. See, e.g., CONTAMINATED SOILS FORUM: POLICY SUB-COMMITTEE: FOCUS GROUP ON NEED FOR UNIFORM POLICY, available at http://www.dep.state.fl.us/waste/quick_topics/publications/wc/csf/focus/cufg_gs.pdf; SMITH, *supra* note 11, at 8-14.

Although RCRA permits the EPA to delegate program authority to individual states, regulatory authority under CERCLA remains solely in the hands of the federal government. However, notwithstanding the federal retention of authority, state regulations may play an important role in the remediation of a CERCLA site. Specifically, in order to “assur[e] protection of human health and the environment,”¹⁹⁴ the remedial action selected for the site must account for all “legally applicable or relevant and appropriate ... requirement” (“ARAR”).¹⁹⁵ According to CERCLA, any standard established under federal law constitutes an ARAR.¹⁹⁶ Moreover, ARARs include those standards, promulgated by the state in which the site is located, that are more stringent than federal standards.¹⁹⁷

Often, whether a state standard constitutes an ARAR is not as clear cut as one might believe. Generally, the judiciary interprets ARARs to be those state standards that are: (1) properly promulgated; (2) more stringent than federal standards; (3) legally applicable or relevant and appropriate; and (4) timely identified.¹⁹⁸ According to the EPA regulations, promulgation refers to “laws imposed by state legislative bodies and regulations developed by state agencies that are of general applicability and are legally enforceable.”¹⁹⁹

Interestingly, in *United States v. City of Fort Lauderdale*,²⁰⁰ the United States District Court for the Southern District of Florida answered the question of whether pre-Global RBCA soil CTLs constituted ARARs. *Fort Lauderdale* concerned an action brought by the United States against the City of Fort Lauderdale and numerous other public and private entities for alleged disposal of hazardous wastes at the Wingate Road Landfill.²⁰¹ Subsequent to filing of the action, the parties agreed to a consent decree for remedial action, including approximately twenty million dollars in payments

194. 42 U.S.C. § 9621(d)(1) (2000).

195. *Id.* at § 9621(d)(2)(A)(ii).

196. *Id.* at § 9621(d)(2)(A)(i). According to the statute, these federal laws include, but are not limited to, the Toxic Substances Control Act, 15 U.S.C. § 2601-2692, the Safe Drinking Water Act, 42 U.S.C. § 300(f)-300(j)(6), the Clean Air Act, 42 U.S.C. § 7401-7671(q), the Clean Water Act, 33 U.S.C. § 1251-1387, the Marine Protection, Research and Sanctuaries Act, 16 U.S.C. § 1431-1445, § 1447-1447(d), 33 U.S.C. § 1401-1445, § 2801-2805, and the Solid Waste Disposal Act, 42 U.S.C. § 6901-6992(k).

197. 42 U.S.C. § 9621(d)(2)(A)(ii) (2000).

198. See *United States v. Akzo Coatings of Am., Inc.*, 949 F.2d 1409, 1440 (6th Cir. 1991).

199. *Id.* (quoting the EPA, Superfund Program; Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements; Notice of Guidance, 52 Fed. Reg. 32,495, 32,498 (Aug. 27, 1987)).

200. 81 F. Supp. 2d 1348 (S.D. Fla. 1999) (omnibus order and order granting motion to enter consent decree).

201. *Id.* at 1349.

from the defendants.²⁰² However, multiple third parties filed motions in opposition of the consent decree, bringing about the cited order.²⁰³

Although the district court disposed of the third-party motions on standing grounds,²⁰⁴ these motions raised issues the court considered “significant” and “requir[ing] this Court’s close and careful scrutiny.”²⁰⁵ Specifically, one of the third parties argued that the requirements of Florida’s brownfields, dry-cleaning, and petroleum programs contained in Chapter 376, *Florida Statutes*, constitute ARARs which the selected remedial action must attain.²⁰⁶ In rejecting this argument, the district court cited the Sixth Circuit’s discussion in *Akzo Coatings* regarding the EPA’s definition of “promulgated.”²⁰⁷ The district court concluded that these three programs established within Chapter 376 “are not enforceable pollution standards that apply across the state, and thus are not ‘promulgated’ for CERCLA purposes.”²⁰⁸

Interestingly, the district court in *Fort Lauderdale* noted that the FDEP believed that the cleanup standards established by the three cited Chapter 376 programs were ARARs.²⁰⁹ Nevertheless, the court concluded that federal law, not state law, determined whether a state statute constituted an ARAR.²¹⁰ However, following the Southern District’s decision in *Fort Lauderdale*, the FDEP declared that the soil CTLs contained in Chapter 62-777 of the *Florida Administrative Code* only apply to program sites and “may not be imposed by the agency as rule, standards, or to deny a permit” for sites outside of those programs.²¹¹

Of course, Global RBCA applies the CTLs to “all contaminated sites” resulting from a discharge of pollutants or hazardous substances where legal responsibility for site rehabilitation exists pur-

202. *Id.*

203. *Id.*

204. *Id.* at 1350. “CERCLA contains a statutory bar to public participation in federal court at this point in time.” *Id.*

205. *Id.*

206. *Id.* at 1351.

207. *Id.* (quoting *Akzo Coatings*, 949 F.2d at 1440).

208. *Id.* at 1351-52. “The state statutes in question provide incentives to particular industries to comply with stricter standards in return for liability protection and or streamlining of other regulations, and are by their own terms are (sic) not applicable to the Wingate site.” *Id.*

209. *Id.* at 1352 n.6 (citing Letter from Jack Chisolm, Deputy General Counsel, Fla. Dep’t of Env’tl. Prot. to Phyllis Harris, Director and General Counsel, Env’tl. Accountability Div., U.S. Env’tl. Prot. Agency, Region IV, at 3 (June 3, 1998)).

210. *Fort Lauderdale*, 81 F. Supp. 2d at 1352 n.5.

211. Ruddell, *supra* note 122 (emphasis added). Furthermore, the memorandum states that “[t]his guidance supersedes previous guidance memos dated September 29, 1995, January 19, 1996, and September 22, 1999.” *Id.*

suant to [Chapters 376 and 403].”²¹² Therefore, because it established “pollution standards that apply across the state” and was developed by the FDEP pursuant to legislative mandate, Global RBCA abruptly eliminated the argument utilized by the district court in *Fort Lauderdale* that cleanup target levels fail to satisfy the definition of properly “promulgated” standards.²¹³

Moreover, the regulations enacted pursuant to Global RBCA satisfy the remaining three ARAR criteria identified by the Sixth Circuit in *Akzo Coatings*. Specifically, CTLs certainly constitute “legally applicable or relevant and appropriate” standards as the Legislature expressly applied them to all “contaminated sites” identified by the state.²¹⁴ Furthermore, and a substantial concern for those determined to be potentially responsible parties of a CERCLA site in Florida, CTLs are likely to be more stringent than federal standards. Due to the 1×10^{-6} target risk level utilized by the FDEP in the calculation of CTLs²¹⁵ and the EPA’s utilization of an acceptable risk range of 1×10^{-4} to 1×10^{-6} when calculating remediation goals for those chemicals lacking an ARAR,²¹⁶ it may be necessary for CERCLA remediation projects to attain cleanup standards that differ by orders of magnitude than those required by the EPA for pre-Global RBCA sites. Undoubtedly, potentially responsible parties prefer the flexibility offered by the EPA’s risk range rather than the rigidity of Florida’s CTL approach.²¹⁷

Departing from the required elements of common law tort litigation, CERCLA lacks the “traditional elements of tort culpability”²¹⁸ and applies strict liability to cost recovery actions.²¹⁹ Accordingly, liability under CERCLA is not dependant upon a causal connection between a release or threatened release and harm to the environment,²²⁰ but is dependant upon whether the release or threatened release resulted in response costs.²²¹

As such, though implementing Global RBCA, the Florida Legislature lacked the desire to “establish any new liability for site

212. FLA. STAT. § 376.30701(1)(b) (2005) (emphasis added).

213. *Id.*; *Fort Lauderdale*, 81 F. Supp. 2d at 1351.

214. *Akzo Coatings*, 949 F.2d at 1441, 1421.

215. *See supra* Section III.B.2.

216. SMITH, *supra* note 11, at 12.

217. *Id.*

218. *United States v. Monsanto Co.*, 858 F.2d 160, 168 (4th Cir. 1988).

219. GLICKSMAN, *supra* note 80, at 854-56.

220. *Control Data Corp. v. SCSC Corp.*, 53 F.3d 930, 935 (8th Cir. 1995).

221. *Id.*; *see also United States v. Hercules, Inc.*, 247 F.3d 706, 716 n. 8 (8th Cir. 2001) (“The argument that the government must prove a direct causal link between the incurrence of response costs and an actual release caused by a particular defendant has been rejected by ‘virtually every court’ that has directly considered the issue.” (quoting *United States v. Alcan Alum. Corp.*, 964 F.2d 252, 264-65 (3d Cir. 1992) (citing cases)).

rehabilitation.”²²² Even if the Legislature wished to, the interpretation of CERCLA provisions constitutes a federal question of law and, therefore, liability would remain strict. However, as stated by the Fifth Circuit in *Amoco Oil Co. v. Borden, Inc.*,²²³ “[a]s [ARARs] define the limits of appropriate response costs, and therefore recoverable expenses, they are also useful for establishing the limits of liability.”²²⁴ That is, ARARs establish the monetary extent of liability and, most certainly, the more stringent the ARAR, the more expenses will be incurred meeting that standard.

2. *The Unhealthy Reliance upon Institutional Controls*

As discussed in Section III.B.4., Florida’s RBCA regulations permit remediation to contaminant concentrations greater than residential standards subject to implementation of institutional controls. Essentially, institutional controls “ensure that the actual use to which a site is put after cleanup is compatible with the level of cleanup completed.”²²⁵ As such, institutional controls enable the liable party to leave contamination on site, thereby potentially saving millions of dollars in remediation costs.²²⁶ Furthermore, proponents of institutional controls claim that institutional controls often create greater protection of human health and the environment through two routes. First, remedies relying upon institutional controls often avoid extensive excavation and construction activities that may result in human health risks or further release of contaminants into the environment.²²⁷ Second, remediation of the last ten percent of contamination often costs exceedingly more than that of the first ninety percent, thereby subjecting responsible parties to substantial costs which provide little additional human health protection.²²⁸

222. FLA. STAT. § 376.30701(1)(a) (2005).

223. 889 F.2d 664 (5th Cir. 1989).

224. *Id.* at 671.

225. John Pendergrass, *Use of Institutional Controls as Part of a Superfund Remedy: Lessons from Other Programs*, 26 ENVTL. L. REP..10,109, at 10,110 (1996).

226. Karmel, *supra* note 124, at 361.

227. *Id.* at 391-92 (citing a CERCLA remediation project in which the construction workers risk of death equaled approximately 20 in 10,000 — far greater than the 1x10⁻⁴ to 1x10⁻⁶ risk range used by the EPA).

228. BREYER, *supra* note 147, at 10-19.

a. Opposition to Institutional Controls

The concept of institutional controls is not without its critics.²²⁹ Primarily, opponents decry the lack of certainty created by institutional controls. That is, removal or remediation of contamination eliminates any potential exposure in the future, whereas institutional controls depend entirely upon future enforcement of their restrictions to ensure efficacy.²³⁰ Further still, other opponents argue that even though institutional controls may be financially attractive in the short-term, in the long-term institutional controls may actually cost more than remediating to residential standards once the property's less economically valuable land use, enforcement costs, litigation costs, and potential health costs are considered.²³¹ Finally, as discussed more thoroughly in the subsequent subsection, institutional controls often rely heavily upon a local government's control of local land use.²³²

According to FDEP guidance, restrictive covenants and conservation easements constitute the preferred institutional controls in Florida.²³³ Unfortunately, both methods are problematic. Restrictive covenants restrict the use of property and purport to run with the land such that successor landowners are bound as well.²³⁴ However, critics posit that because the government holds the covenant such agreements do not "touch and concern the land" and, therefore, are in gross and lack enforceability.²³⁵

On the other hand, a conservation easement grants a third party the right to use the property of another and, therefore, is more easily held in gross.²³⁶ Nevertheless, due to the nature of an

229. See, e.g., Jeffrey M. Gaba, *Tulk v. Moxhay and Texas Environmental Law: Land Use Restrictions under the Texas Risk Reduction Program*, 55 SMUL REV. 179 (2002) (arguing that institutional controls applied pursuant to Texas' RBCA program fail to effectively restrict subsequent owners); see generally Seth Schofield, *In Search of the Institution in Institutional Controls: The Failure of the Small Business Liability Relief and Brownfields Revitalization Act of 2002 and the Need for Federal Legislation*, 12 N.Y.U. ENVTL. L.J. 946 (2005) (discussing the inadequate legal mechanisms of the institutional controls promoted by the Brownfields Act of 2002).

230. Karmel, *supra* note 124, at 362.

231. See Schofield, *supra* note 229 at 966-67.

232. Karmel, *supra* note 124, at 362.

233. See generally DIV. OF WASTE MGMT., FLA. DEPT OF ENVTL. PROT., *supra* note 171 at 7-14.

234. Schofield, *supra* note 229, at 981.

235. *Id.*

236. *Id.* at 982.

institutional control as a negative encumbrance, concerns exist as to the efficacy of such easements as the judiciary typically discourages negative easements.²³⁷ Therefore, as with restrictive covenants, enforceability of conservation easements may constitute a valid concern.

b. Institutional Controls and Florida's Growth Management System

Simply stated, "[t]he key to the success of land-use-restricted environmental cleanups is to allow them to be done only in situations where the use of the contaminated property will not change to an unanticipated use with greater exposures."²³⁸ In essence, because they restrict use to commercial or industrial purposes, land use restrictions should only be implemented when it is certain that the property will remain non-residential.

Therein lies the problem. Drawn by Florida's warm weather, sunny beaches, and absence of a state income tax, Florida's population growth remains amongst the greatest in the nation.²³⁹ Between 1990 and 2000, Florida's population growth rate was 23.5%.²⁴⁰ Although it creates a boom in the real estate market, this rapid growth stresses Florida's growth management system substantially. Notwithstanding attempts to address the issue such as the enactment of Florida's Local Government Comprehensive Planning and Land Development Regulation Act (Growth Management Act),²⁴¹ the State Comprehensive Plan,²⁴² and the development of a regulated riparian water rights system to ease water consumption concerns,²⁴³ growth management remains one of Florida's most difficult challenges.²⁴⁴ Most recently, the lack of affordable housing, particularly in South Florida following the 2004

237. *Id.* It should be noted, however, that an affirmative obligation to maintain an engineered control may not face such judicial scrutiny. *Id.*

238. Alex Geisinger, *Rethinking Risk-Based Environmental Cleanup*, 76 IND. L.J. 367, 376-77 (2001).

239. FLORIDA'S GROWTH MGMT. STUDY COMM'N, A LIVEABLE FLORIDA FOR TODAY AND TOMORROW 5 (2001). According to 2000 census data, approximately 16 million people reside in Florida, a population which is expected to reach 22 million by 2025 and 24 million by 2030. *Id.*

240. Florida Quick Facts: Florida Population, <http://www.stateofflorida.com/portal/desktopdefault.aspx?tabid=95>.

241. FLA. STAT. § 163, Part II (2005).

242. FLA. STAT. § 187 (2005).

243. See FLA. STAT. § 373.012-.197 (1995).

244. David L. Powell, *Growth Management: Florida's Past as Prologue for the Future*, 28 FLA. ST. L. REV. 519, 531 (2001).

hurricane season, has raised anxiety among those with an eye towards growth management.²⁴⁵

So, how does Global RBCA tie into growth management? Perhaps the most correct answer is: it does not. A thorough review of Section 376.30701, *Florida Statutes*, and Chapter 62-780 fails to reference growth management or the Growth Management Act. Moreover, the Growth Management Act fails to mention risk-based institutional controls.

Unfortunately, the guidance document, published as an aid to FDEP personnel considering implementation of institutional controls, provides for only limited communication with a local government, despite such institutional controls forming the lynchpin of any remedial option developed pursuant to RMO II or III.²⁴⁶ Although Global RBCA grants a local government the ability to comment on proposed institutional controls within the local government's boundaries, the FDEP need not seek the approval of the local government when agreeing to an institutional control.²⁴⁷ This paucity of local government input may not seem all that damaging when evaluating a single parcel. Yet, when multiple parcels become the subject of institutional controls, the resulting patchwork of restricted use may dramatically affect a local government's ability to regulate land use.

In addition, although the FDEP maintains a database containing institutional controls,²⁴⁸ the only means available to inform a local government of the existence of an institutional control, beyond the aforementioned actual notice provided at approval, is through recordation of the restrictive covenant or conservation easement with the county or city clerk's office.²⁴⁹ Regrettably, such recordation does not transfer to that local government's comprehensive plan. As the legislation controlling a local government's growth management,²⁵⁰ the local comprehensive plan serves as the primary source of information for a party interested in the allowable uses of a piece of property.

245. Dee Carper, *2005 Legislative Priorities: Hurricanes Force Focus on Affordable-Housing Shortage*, FL. LEAGUE OF CITIES, available at http://www.flcities.com/legislative/affordable_housing.asp (last visited Oct. 8, 2006).

246. See *supra* Section III.B.3.

247. FLA. STAT. § 376.30701(2)(d) (2005).

248. See INSTITUTIONAL CONTROLS REGISTRY, available at <http://www.dep.state.fl.us/waste/categories/wc/default.htm> (follow the link titled "Institutional Controls Registry" in the bottom right hand corner) (last visited Nov. 16, 2006).

249. See generally FLA. DEPT OF EVNTL. PROT., INSTITUTIONAL CONTROLS PROCEDURES GUIDANCE 15 (2004).

250. Thomas G. Pelham, *Restructuring Florida's Growth Management System: Alternative Approaches to Plan Implementation and Concurrency*, 12 U. FLA. J.L. & PUB. POL'Y, 299, 303 (2001).

Finally, related to the aforementioned enforceability concerns, no privity of contract exists between the owner of the restricted property and the local government, making the local government incapable of enforcing the agreement.²⁵¹ Instead, the local government must persuade the FDEP to evaluate the situation and bring the landowner into compliance. Due to the perpetual nature of institutional controls, placing sole responsibility for their enforcement with a single state agency seems overly burdensome. For example, although the FDEP does not provide data as to the number of contaminated sites under institutional controls,²⁵² as of December 2004, 17,627 contaminated sites were regulated as program sites.²⁵³ As the ability to utilize institutional controls in Florida first became available in 1997 for use at program sites, the volume of contaminated sites utilizing institutional controls will only increase, especially following the enactment of Global RBCA which allows their use at all sites, rather than only program sites.

V. CONCLUSIONS

Florida's application of RBCA to all contaminated sites within the state certainly creates the uniformity that regulators, environmentalists, and regulated parties have desired since the first application of these principles to petroleum sites in 1996. The location of the site or the contaminants of concern will no longer govern the remediation methodology employed to cleanup the contamination.

However, a rich and detailed science underlies the risk-based values used to regulate these contaminated sites. This author fears that the interested parties' lack of understanding vis-à-vis the scientific and historical foundations of risk assessment will result in a failure to question risk-based decisions when these decisions deserve questioning and closer scrutiny. Because once a numerical value is published, for the most part that number becomes the guidance for any actions to be taken, notwithstanding the

251. See Amy L. Edwards, *Institutional Controls: The Converging Worlds of Real Estate and Environmental Law and the Role of the Uniform Environmental Covenant Act*, 35 CONN. L. REV. 1255, 1261 (2003) (discussing enforcement concerns relating to a lack of privity in restrictive covenants).

252. See generally INSTITUTIONAL CONTROLS REGISTRY, *supra* note 248. FDEP Institutional Controls Registry allows the user to search for sites at which institutional controls are utilized via a geographic information system interface; however, it does not provide summary data. *Id.*

253. See generally FLA. DEP'T OF ENVTL. PROT., FINAL STATEMENT OF ESTIMATED REGULATORY COST FOR PROPOSED REVISIONS TO: CHAPTER 62-777, F.A.C., "CONTAMINANT TARGET CLEANUP LEVELS," available at <http://www.dep.state.fl.us/waste/categories/wc/pages/ERCAAdoptionHearing020205.htm> (last visited Nov. 16, 2006).

many assumptions and inputs, applicable to the immediate situation or not, used to calculate that value.

Furthermore, although the appeal of uniform remedial assessment across the state is great, implementation of Global RBCA will have other legal consequences. Most notably, Global RBCA will create more stringent ARARs for remediation at CERCLA sites. Although many may argue that this increased stringency is not a detrimental result of Global RBCA, it will reduce remedial flexibility for both the EPA and potentially responsible parties. Moreover, Global RBCA will impose considerable restraints upon a local government's ability to control land use within its borders. These restraints contradict Florida's Growth Management Act which grants a great deal of land use control to local governments.

RECENT DEVELOPMENTS

WILLIAM P. KEITH

I.	INTRODUCTION.....	139
II.	FEDERAL CASE LAW.....	140
III.	FLORIDA CASE LAW.....	145
IV.	FLORIDA'S 2006 LEGISLATIVE SESSION.....	151

I. INTRODUCTION

Court decisions and legislative action in 2006 continued to have a large impact in the land use and environmental law arenas as they have in recent years. In a case exemplifying the clash between two popular issues, private property rights and federal environmental regulation, the United States Supreme Court issued a highly anticipated decision in *Rapanos v. United States*.¹ Since it is not possible to fairly present every legal event contributing to the land use and environmental legal fields in a single writing, this article provides a summary of notable case law and statutory developments occurring in the past year.

To further explore and keep up to date on current legal issues, there are a variety of helpful resources available. The Environmental Protection Agency (EPA),² the Florida Department of Environmental Protection (DEP),³ and the Florida Department of Community Affairs⁴ provide current news and information on their websites. The Environmental and Land Use Law Section of the Florida Bar maintains an excellent website with articles covering new Florida case law, legislation, and agency developments.⁵ The Florida Senate website is a helpful resource when researching state legislation.⁶ Finally, a handful of law firms frequently release publications providing updates on developments in the environmental law and land use fields.⁷

1. 126 S. Ct. 2208 (2006).
2. U.S Environmental Protection Agency, <http://www.epa.gov>.
3. Florida Department of Environmental Protection, <http://www.dep.state.fl.us>.
4. Florida Department of Community Affairs, <http://www.dca.state.fl.us>.
5. The Environmental and Land Use Section of the Florida Bar, <http://www.eluls.org>.
6. The Florida Senate, <http://www.flsenate.gov>.
7. Holland & Knight, LLP, <http://www.hgslaw.com>; Hopping Green & Sames, P.A., <http://www.hgslaw.com>.

II. FEDERAL CASE LAW

Rapanos v. United States, 126 S. Ct. 2208 (2006)

Rapanos directly called into question the extent of the federal government's jurisdiction to regulate wetlands under the Clean Water Act (CWA).⁸ Specifically, the issue was whether wetlands which empty into traditional navigable waterways through ditches or manmade drains could be regulated.⁹ While the case provided the Court an opportunity to clarify the Act's reach and the Army Corps of Engineers permitting authority,¹⁰ the fractured opinion seems instead to have thrown the issue into a further state of confusion.¹¹

The first of two cases consolidated in this appeal was a civil enforcement action against John Rapanos, a Michigan developer who backfilled land with "sometimes-saturated soil conditions" without obtaining the required permit.¹² While the wetlands were connected to navigable waterways through storm drains and streams, the nearest such water to the three sites in question was eleven to twenty miles away.¹³ The Sixth Circuit upheld the trial court's determination that the wetlands fell within the Corps' jurisdiction holding that "there were hydrological connections between all three sites and corresponding adjacent tributaries of navigable waters."¹⁴ In the second case, the Carabells challenged federal jurisdiction over a wetland on a parcel of land they owned after they were denied a fill permit.¹⁵ The wetland was separated from a man-made ditch which connected to other ditches and creeks to Lake St. Clair, a navigable waterway. Similarly, the Sixth Circuit affirmed, holding that the wetland was "'adjacent' to navigable waters."¹⁶

In a 5-4 decision, the Supreme Court vacated and remanded, holding that the district court had applied the wrong standard in determining whether the wetlands were within the Corps' jurisdiction.¹⁷ The Justices, however, were more divided on the details. The plurality opinion written by Justice Scalia held

8. Clean Water Act of 1972, 33 U.S.C. §§ 1251-2000 (2000).

9. *Rapanos*, 126 S. Ct. at 2219.

10. See 33 U.S.C. § 1344 (2000).

11. See, e.g., Andrew Giaccia, *Environmental Update*, 2006 WLNR 16599695, Sept. 25, 2006.

12. *Rapanos*, 126 S. Ct. at 2214.

13. *Id.*

14. *Id.* at 2219 (quoting *United States v. Rapanos*, 376 F.3d 629, 643 (6th Cir. 2004)).

15. *Id.*

16. *Id.*

17. *Id.* at 2235, 2252.

that for a wetland to come within the ambit of the Act's jurisdiction, it must either be a "[water] of the United States," defined as being "relatively permanent, standing or continuously flowing," or adjacent to such a water. Adjacency requires the maintenance of a "continuous surface connection."¹⁸

The dissent, led by Justice Stevens, criticized the limitations in the Corps' regulatory powers which would result from narrowly reading of the CWA. It asserted that the standards articulated by the plurality and Justice Kennedy were not aligned with Congress' expansive goal to regulate pollution, and would disregard the deference extended to the Corps to regulate issues of a complex and technical nature.¹⁹

Somewhere in between the two camps was Justice Kennedy, who, while agreeing with the plurality's conclusion, set out an entirely different standard for determining whether a wetland was regulable under the CWA. Under his analysis, the Corps would be required to establish, on a case-by-case basis, whether there is a "significant nexus between the wetlands in question and navigable waters" which the Clean Water Act sought to protect.²⁰ Kennedy dismissed the plurality's limitations as being unsupported by the Act's text and previous case law.²¹ He reasoned that, when interpreting a statute concerned with downstream water quality, it made little sense to limit it to waters that are continuously flowing or those which maintained a continuous surface connection to such waters, but must necessarily include waters affected by more infrequent events such as "flood[s]" and "inundation[s]."²² While it is unlikely that the ramifications of this decision have been completely felt, it is already apparent that it has raised questions as to what test should be applied and how the Corps' permitting program will be modified.²³

18. *Id.* at 2225-26 (plurality opinion).

19. *Id.* at 2252 (Stevens, J., dissenting).

20. *Id.* at 2248 (Kennedy, J., concurring).

21. *Id.* at 2242-49.

22. *Id.* at 2242-43.

23. *Courts Face New Challenges Over Clean Water Act Jurisdiction Tests*, 2006 WLNR 16800871, INSIDE THE EPA, Sept. 9, 2006. While there are a handful of pending cases raising jurisdictional issues under the CWA, the Ninth and Seventh Circuits recently chose to follow Justice Kennedy's test to determine whether certain waters could be regulated. The Ninth Circuit found a "significant nexus" between a rock quarry pit called Basalt Pond and the adjacent Russian River in California, holding that the Clean Water Act had been violated by the city when it discharged treated sewage into the pond. *N. Cal. River Watch v. Healdsburg*, 457 F.3d 1023, 1033 (9th Cir. 2006). Similarly, in *United States v. Gerke Excavating, Inc.*, 464 F.3d 723, 725 (7th Cir. 2006), the Seventh Circuit remanded the case to the district court for further fact finding pursuant to the Kennedy test. *See also* *U.S. v. Johnson*, 467 F.3d 56 (1st Cir. 2006). There has not yet been any significant *Rapanos* litigation in Florida.

S.D. Warren Co. v. Maine Bd. of Environmental Protection., 126 S. Ct. 1843 (2006)

The operator of a series of hydroelectric dams on the Presumpscot River in southern Maine sought review of a decision requiring it to apply for a permit from the Maine Department of Environmental Protection, because the dams had the potential to cause a “discharge” under Section 401 of the Clean Water Act.²⁴ Under Section 401, an applicant seeking a federal license (in this case a license from the Federal Energy Regulatory Commission) for an activity which could cause “any discharge into the navigable waters” of the United States must first seek state certification that environmental laws will not be violated.²⁵

In 1999, when Warren had to reapply for FERC permits, it also applied for the state water quality permits under protest, contending that state approval was unnecessary because the dams did not discharge anything into the river.²⁶ The Maine Department of Environmental Protection issued a certification requiring Warren “to maintain a minimum stream flow in the bypassed portions of the river and to allow passage for migratory fish and eels.” When the FERC issued the federal permits subject to the conditions set by the state, Warren pursued administrative appeals to void the need to get state certification. When those measures failed, it filed in state court, and eventually made its way to the Supreme Judicial Court of Maine where the original determination was upheld.²⁷

A unanimous Court agreed that the dams did create the potential for a “discharge” both as that word is ordinarily construed and in light of congress’s broad goals in passing the Clean Water Act.²⁸ Justice Souter, writing for the Court, noted that the Environmental Protection Agency, the FERC, and the Court’s previous opinions recognized that discharges from hydroelectric dams fell within the Act.²⁹ The Court rejected Warren’s three arguments that the term “discharge” should be read in a different way. First, it dismissed an argument based on an interpretive cannon as “out of place.”³⁰ Second, Warren tried to draw a parallel between the present situation and cases interpreting section 402 of the CWA. The Court held that Sections 402 and 401 of the Clean Water Act were not interchangeable, pointing out that while they have his-

24. *S.D. Warren Co. v. Maine Bd. of Envntl. Prot.*, 126 S. Ct. 1843, 1846 (2006).

25. *Id.*

26. *Id.* at 1847.

27. *Id.*

28. *Id.* at 1847-52.

29. *Id.* at 1847.

30. *Id.* at 1849.

torical similarities Section 401 is broader because it uses the word “discharge” alone, rather than “discharge of a pollutant.”³¹ Similarly, the third argument, that congress had inadvertently left a word on the books when it edited the statute, was also unavailing.³² Finally, in affirming the need for Warren to get state approval, the Court reasoned that limiting river flow and passing water through turbines could have environmental consequences over which Section 401 clearly sought to give a state the authority to regulate.³³

San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission, 449 F.3d 1016 (9th Cir 2006)

At issue was whether the environmental consequences of a terrorist attack on a nuclear facility must be considered in the environmental review required by the National Environmental Policy Act (NEPA).³⁴ The question arose after Pacific Gas & Electric Co. received a license from the Nuclear Regulatory Commission (NRC) to build an Interim Spent Fuel Storage Installation at its Diablo Canyon power plant in San Luis Obispo, California.³⁵ Two nonprofit groups, the San Luis Obispo Mothers for Peace and the Sierra Club, along with one individual, filed petitions to intervene. Among other complaints, the petitioners claimed that in approving the Diablo Canyon facility the ERC had failed to “address environmental impacts of terrorist [sic] or other acts of malice or insanity.”³⁶ The ERC relied on its own precedent stating that the possibility of terrorist attacks was so remote that it need not be considered.³⁷

NEPA places procedural requirements on federal agencies such as the NRC, requiring them to prepare an Environmental Impact Statement or a more limited Environmental Assessment to ensure that the agency has taken environmental concerns into consideration when issuing licenses.³⁸ While the court dismissed petitioners’ claims that the ERC had violated the Administrative Procedure Act and AEA in denying petitioners a hearing,³⁹ it con-

31. *Id.* at 1849-50.

32. *Id.* at 1851-52.

33. *Id.* at 1853.

34. *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm’n*, 449 F.3d 1016, 1019 (9th Cir 2006).

35. *Id.* at 1019-20.

36. *Id.* at 1021-22.

37. *Id.* at 1022.

38. *Id.* at 1020.

39. *Id.* at 1027.

cluded that the ERC had failed to follow NEPA requirements when submitting its Environmental Assessment.⁴⁰

First, the court rejected ERC's contention that the possibility of a terrorist attack was "too far removed from the natural or expected consequences of agency action," finding that ERC had been unreasonable in "categorically dismiss[ing]" that claim and that such action was inconsistent with other government efforts to protect nuclear facilities.⁴¹ Second, the court dismissed the contention that the risk of a terrorist attack could not be adequately calculated. Rather than determining a numeric probability, the ERC could assess the "modes of attack, weapons, and vulnerabilities of [the] facility, and the possible impact of each of these on the physical environment."⁴² Third, while the ERC was correct that it was not required to conduct a "worst -case" analysis, the petitioners were nevertheless entitled to a determination of the possible environmental consequences of a terrorist attack.⁴³ Finally, the court held ERC's fourth factor, that it could not comply with NEPA because of "security risks," was unreasonable. While NEPA standards could be modified to be consistent with other programs, sensitivity did not amount to a NEPA waiver.⁴⁴

New York v. Environmental Protection Agency, 443 F.3d 880 (D.C. Cir. 2006)

The D.C. Circuit Court of Appeals vacated the Environmental Protection Agency's Equipment Replacement Provision (ERP), finding it inconsistent with language in Section 111(a)(4) of the Clean Air Act.⁴⁵ Under the Act, when a polluting facility undergoes "any physical change" which increases emissions, it must go through the New Source Review (NSR) permitting process.⁴⁶ The ERP expanded the general exception for when this review can be bypassed, called the Routine Maintenance, Repair, and Replacement Exclusion. The ERP excluded review when replacing functionally equivalent components not exceeding twenty percent of the process unit's replacement value and not changing the unit's basic design parameters, although changes might nevertheless increase emissions.⁴⁷

40. *Id.* at 1035.

41. *Id.* at 1029-31.

42. *Id.* at 1031.

43. *Id.* at 1032-34.

44. *Id.* at 1034.

45. *New York v. Envntl. Prot. Agency*, 443 F.3d 880 (D.C. Cir. 2006).

46. *Id.* at 883.

47. *Id.*

Central to the disagreement was the meaning of the words “any” and “physical change” in the Act.⁴⁸ While EPA argued that it was accorded deference to define what a “physical change” meant under the statute, the court disagreed.⁴⁹ Applying the *Chevron* test—determining whether Congress had spoken directly to the issue—the court found that the Clean Air Act defined “physical change” in terms of emissions increases.⁵⁰ Consistent with the rest of the Act and rules of statutory interpretation, the word “any” should be given an expansive reading.⁵¹ Therefore, under Section 111(a)(4) the EPA should be required to perform a NSR whenever an emissions-increasing modification occurs which falls within one of the ordinary meanings of “physical change.”⁵²

III. FLORIDA CASE LAW

AT&T Wireless Services of Florida v. WCI Communities, Inc., 932 So. 2d 251 (Fla. 4th DCA 2005)

In 1975, Florida National Properties granted, by warranty deed, a piece of land to the City of Coral Springs. The property eventually became Sherwood Forest Park.⁵³ WCI, a major developer and landowner in the area, was the successor-in-interest to the grantor of the deed, which stated that the property would be used “solely for passive park purposes unless the express written consent of Grantor, its successors or assignees, is first obtained.”⁵⁴ In 1996, the City passed an ordinance allowing for the siting of telecommunications towers in some public parks, and in 2001, the City, over WCI’s objections, approved the leasing of 1600 square feet of park property to AT&T for construction of an equipment building.⁵⁵ And in 2002, the City approved the construction of an eighty-five foot telecommunications tower.⁵⁶

WCI sought injunctive relief claiming that the construction of the tower was not a passive use, but an active commercial use.⁵⁷ The court found no ambiguity in the deed restriction and granted WCI injunctive relief, allowing AT&T twenty-four months

48. *Id.* at 885.

49. *Id.*

50. *Id.* at 886.

51. *Id.* at 887-89.

52. *Id.* at 889-90.

53. *AT&T Wireless Servs of Fla. v. WCI Cmty., Inc.*, 932 So. 2d 251, 253 (Fla. 4th DCA 2005).

54. *Id.* at 253.

55. *Id.* at 253-54.

56. *Id.* at 254.

57. *Id.*

to find a suitable site to relocate the tower.⁵⁸ The appellate court affirmed, slightly reframing the issue and holding that the tower did not relate to the furtherance of “solely for passive park purposes” since it was used solely for AT&T’s monetary gain.⁵⁹ The court rejected the argument that the tower was only a de minimus violation, and found that it was not merely incidental to the park’s intended use.⁶⁰

Brevard County v. Stack, 932 So. 2d 1258 (Fla. 5th DCA 2006)

In this appeal of a non-final order, the 5th DCA upheld the constitutionality of the Bert J. Harris, Jr., Private Property Protection Act.⁶¹ In 2003, Charles Stack entered into a \$1.1 million contract to sell four acres of land to a developer who wanted to build a shopping center and restaurant.⁶² Since the property contained a one acre wetland and was zoned as “community commercial,” it was governed by a county ordinance prohibiting the development of wetland properties with such a zoning designation. Upon discovering the ordinance the developer opted to cancel the contract. Stack subsequently filed a claim to recover \$1 million from the county under the Act, claiming the ordinance had diminished the value of the property.⁶³

The trial court granted summary judgment in favor of Stack on the issue of liability, giving credence to his argument that he had pre-existing property rights and “reasonable investment backed expectations” when buying the land in the 1980s.⁶⁴ On appeal, the court dismissed the government’s arguments that the Act was a due process violation because it authorized local governments to contract away their police powers.⁶⁵ Similarly, it rejected claims that the Act violated the separation of powers doctrine by enlarging the judiciary in interpreting the takings clause.⁶⁶ Ultimately, however, the court remanded the case so the trial court could make certain factual findings. Namely, the trial court must determine whether there was an existing use of the property or a vested right to use it, and whether the governmental entities inordinately burdened the land.⁶⁷

58. *Id.*

59. *Id.* at 255-56.

60. *Id.* at 256.

61. FLA. STAT. § 70.001 (2006).

62. *Brevard County v. Stack*, 932 So.2d 1258, 1260 (Fla. 5th DCA 2006).

63. *Id.*

64. *Id.* at 1261.

65. *Id.* at 1261-62.

66. *Id.* at 1262.

67. *Id.* at 1262; FLA. STAT. § 70.001(6)(a) (2006).

Russo Ass'n, Inc. v. City of Dania Beach Code Enforcement Board., 920 So. 2d 716 (Fla. 4th DCA 2006)

In *Russo*, the court held that the statute of limitations to file suit under the Bert J. Harris, Jr., Private Property Rights Protection Act⁶⁸ was four years.⁶⁹ The dispute in this case arose when Dania Beach made zoning changes which resulted in Russo's current property use being incompatible with the new classification on August 31, 2000.⁷⁰ Russo presented its written claim to the government in October 10, 2002, and filed suit on February 6, 2004. The Act requires that at least 180 days prior to filing suit under the Act, the property owner seeking compensation present his/her claim to the head of the appropriate governmental entity in writing.⁷¹ Further, a cause of action may not be initiated if the claim is not presented within a year after the regulation which affects the property is first applied.⁷²

While the city contended that Russo had waited too long to file its complaint, the court disagreed.⁷³ It held that although the written claim must be sent to the government entity within a year, the four-year statute of limitations in Section 95.11(3)(f) of the *Florida Statutes*⁷⁴ applies to the filing of the complaint.⁷⁵ Therefore, Russo had filed suit about six months before the statute of limitations expired.⁷⁶

The court noted that the four-year catch-all statute of limitations⁷⁷ had been held to apply to inverse condemnation actions.⁷⁸ Since the intention of the Act was to provide additional remedies to property owners when the governmental action burdened the property's use but did not amount to a taking, it would be unreasonable and against the purposes of the Act to infer that a much "more restrictive statute of limitations, effectively that of six months" would apply.⁷⁹ The court reasoned that the statute's purpose in requiring the landowner to notify the governmental entity and wait for 180 days was to facilitate the amicable resolution of

68. FLA. STAT. § 70.001 (2006).

69. *Russo Ass'n, Inc. v. City of Dania Beach Code Enforcement Bd.*, 920 So. 2d 716, 718 (Fla. 4th DCA 2006).

70. *Id.* at 716-17.

71. FLA. STAT. § 70.001(4)(a) (2006).

72. *Id.* at § 70.001(11).

73. *Russo*, 920 So. 2d at 717.

74. "An action founded on a statutory liability." FLA. STAT. § 95.11(3)(f) (2006).

75. *Russo*, 920 So. 2d at 717.

76. *Id.* at 718.

77. FLA. STAT. § 95.11(3)(p) (2006).

78. *Russo*, 920 So. 2d at 717.

79. *Id.*

the dispute. The passage of the 180 day period simply ripens the claim and allows the claimant to proceed.⁸⁰

Sorrentino v. River Run Condominium Ass'n, 925 So.2d 1060 (Fla. 5th DCA 2006)

The dispute in this case arose when condominium owners, the Sorrentinos, installed two skylights in the ceiling of their unit without obtaining prior written approval from the condominium association.⁸¹ When the association filed suit to require the removal of the skylights, the Sorrentinos counterclaimed, seeking an injunction to disallow the association from making any such demand.⁸² The Sorrentinos argued that the skylights were "solar collectors" and "energy saving device[s] based on renewable resources" under Section 163.04 of the *Florida Statutes*.⁸³ Therefore, a deed restriction or restrictive covenant would be prohibited from requiring their removal.⁸⁴ The statute also provided for attorneys fees to be awarded to the "prevailing party."⁸⁵

The trial court enjoined the association from requiring the Sorrentinos to remove the skylights, finding that the devices fell within the meaning of the statute and that they were properly installed and posed no risk to the building. It did not, however, award the Sorrentinos attorneys' fees because it found that there was no prevailing party; rather, the dispute was the result of a "failure of communication."⁸⁶ On appeal, the 5th DCA held that the trial court had correctly applied the statute to the skylights, but awarded attorneys' fees to the Sorrentinos because they had prevailed on every significant issue raised in the litigation.⁸⁷

County of Volusia v. City of Deltona, 925 So. 2d 340 (Fla. 5th DCA 2006)

In this case, the court held that a proposed annexation by the City of Deltona was not "contiguous" where only 1.6% of the boundary bordered the city.⁸⁸ Involved were three parcels of land, measuring 4626 acres, 339 acres, and ten acres, with only western

80. *Id.*

81. *Sorrentino v. River Run Condo. Ass'n*, 925 So. 2d 1060, 1062 (Fla. 5th DCA 2006).

82. *Id.* at 1062-63.

83. *Id.* at 1063-64.

84. *Id.*; FLA. STAT. § 163.04(2) (2006).

85. FLA. STAT. § 163.04(3) (2006).

86. *Sorrentino*, 925 So. 2d at 1064.

87. *Id.* at 1066.

88. *County of Volusia v. City of Deltona*, 925 So. 2d 340, 344 (Fla. 5th DCA 2006).

boarder of the ten acre parcel (350 feet) touching the city.⁸⁹ After the three property owners filed petitions requesting that the city consider their submitted annexation applications as a whole, the Deltona City Commission adopted an ordinance voluntarily annexing the properties pursuant to Section 171.044 of the *Florida Statutes*.⁹⁰

Reviewing the circuit court's approval of the annexation, the district court examined the statute's contiguousness requirement. While annexation of the ten acre property alone would have been proper under the statute, the properties had to be considered as a whole because the owners submitted a unified application.⁹¹ Therefore, the 350 feet of the ten acre property which represented only 1.6% of the entire 22,116 foot border, failed to meet the requirement that "a substantial part of a boundary of the territory to be annexed by the municipality [be] coterminous with a part of the boundary of the municipality"⁹² Using a narrow corridor to connect the city to a noncontiguous area would defeat unity and compactness, central concepts of a municipal corporation.⁹³ In dicta, the court further stated that the city and the owner of the 4626 acre parcel had engaged in illegal contract zoning by signing their "Pre-Annexation Agreement."⁹⁴ The substantial obligations that the agreement placed on the city, specifically that it not change the parcel's zoning until the annexation was complete, were an illegal delegation of its police powers.⁹⁵

Atlantis at Perdido Ass'n, Inc. v. Warner, 932 So. 2d 1206 (Fla. 1st DCA 2006)

In *Atlantis*, two condominium associations on Perdido Key challenged the DEP's issuance of a Coastal Construction Control Line Permit for a project on a neighboring property.⁹⁶ The proposal was to demolish two one-story structures which had been damaged by Hurricane Ivan (while the permit application was pending) and build a new nine-story condominium.⁹⁷ While the new building would be eighteen feet landward of the previous structure, it nevertheless would be situated 193 feet seaward of the coastal con-

89. *Id.* at 341, 344.

90. *Id.* at 342.

91. *Id.* at 343-44.

92. *Id.* at 343 (quoting FLA. STAT. § 171.031(11) (2006)).

93. *Volusia*, 925 So. 2d at 344.

94. *See id.* at 341-47.

95. *Id.* at 345-46.

96. *Atlantis at Perdido Ass'n, Inc. v. Warner*, 932 So. 2d 1206, 1207-08 (Fla. 1st DCA 2006).

97. *Id.* at 1208-09.

struction control line and forty-five feet seaward of the other structures built on the coast—"a reasonably continuous and uniform line of buildings."⁹⁸

The issue in this case was whether the construction project could be termed a "rebuilding" of the present structure rather than "new" construction seaward of the control line.⁹⁹ Florida Statutes require a DEP permit to build any structure seaward of the coastal construction control line.¹⁰⁰ The DEP may authorize construction for the "repair or rebuilding within the confines of the original foundation" or "for a more landward relocation or rebuilding of a damaged or existing structure if [that would not] cause further harm to the beach-dune system."¹⁰¹ The advantage of being a "rebuilding" rather than new construction is that the DEP does not need to take into account the "reasonably continuous and uniform construction line."¹⁰²

While the DEP argued that the new construction project fell within the meaning of "rebuilding," the court disagreed, holding that the permit authorized something more extensive.¹⁰³ DEP misconstrued its own unambiguous definition of the term "rebuilding," which defined it as "a substantial improvement of *the existing structure*."¹⁰⁴ Further, the definition of "substantial improvement" only contemplates improving the structure "to its pre-damage condition."¹⁰⁵ The court, therefore, found that the DEP's interpretation of the statute was "implausible and unreasonable."¹⁰⁶ Since the project was not a rebuilding, and since the DEP failed to take into account the "reasonably continuous and uniform line of construction," the permit was denied.¹⁰⁷

98. *Id.*

99. *Id.* at 1210.

100. FLA. STAT. § 161.053(2)(a) (2006).

101. *Id.* at § 161.053(13)(a).

102. *Atlantis*, 932 So. 2d at 1211 (quoting FLA. STAT. § 161.053(5)(b)).

103. *Id.* at 1212.

104. FLA. ADMIN. CODE ANN. r. 62B-33.002(47) (2005).

105. FLA. STAT. § 161.54 (12) (2006).

106. *Atlantis*, 932 So. 2d at 1213 (citing *Sullivan v. Fla. Dep't of Env'tl. Prot.*, 890 So. 2d 417, 420 (Fla. 1st DCA 2004)).

107. *Id.* at 1214.

IV. FLORIDA'S 2006 LEGISLATIVE SESSION¹⁰⁸*CS/CS/CS/SB 888 Energy*

With goals such as decreasing reliance on foreign fuels, this bill provides financial incentives to achieve a greater diversity in the state economy's fuel mix and advance the development of renewable energy sources. Driving the initiative are tax breaks for purchasing energy efficient consumer products and using bio-energy fuels, along with the creation of a grant program within the Department of Environmental Protection.

The bill authorizes the Public Service Commission to require public utilities to strengthen their infrastructure, specifically to withstand the threat of hurricanes. The licensing requirements of the Florida Electrical Power Plant Siting Act and the Electrical Transmission Line Siting Act are modified and shortened. Additionally, the bill creates the Florida Energy Commission, composed of nine members, given the task of making annual recommendations for legislation on energy policy as well as a report on state greenhouse gas emissions by December 2007.

CS/CS/SB 980 Energy Reliability

This bill outlines a uniform process for the siting of electrical substations, subject to some local standards. It streamlines the permitting process by, among other things, providing that new substations are a permissible land use in all land use categories and zoning districts. Also, electric utilities are no longer required to obtain permits from local governments for tree-trimming within the right of way of a power line.

HB 7131 Brownfields Redevelopment

This bill amends the Brownfield Redevelopment Act by providing greater tax credits to entities that voluntarily cleanup contaminated brownfield and drycleaning sites. It does not, however, increase the \$2 million annual cap. To provide a greater incentive to finish the process, the credit amount available in the final year of cleanup has also been increased. Additional tax credits

108. This segment is based both on legislative summaries from the Environmental and Land Use Section of the Florida Bar and the Senate Committee on Environmental Preservation. Eric T. Olsen, 2006 Legislative Session Summary (Jul. 6, 2006), http://www.eluls.org/2006/Reporter_July_2006/july06_olsen.html; SENATE COMMITTEE ON ENVIRONMENTAL PRESERVATION, SUMMARY OF LEGISLATION PASSED, *available at* <http://www.flsenate.gov/publications/2006/senate/reports/summaries/pdf/environmental.pdf>.

are available for affordable housing built on the brownfield areas. This bill repeals the Brownfield Property Ownership Clearance Assistance Program and the Brownfield Property Ownership Clearance Assistance Revolving Loan Trust Fund because the fund was never capitalized.

HB 1347 Land Acquisition and Management

This enactment appropriates \$310 million from the Florida Forever Trust Fund for the state's purchase of the Babcock Ranch located in Lee and Charlotte counties. In addition to providing for public recreation, the bill furthers numerous environmental, agricultural, and scientific interests on the newly acquired preserve. A non-profit corporation called the Babcock Ranch, Inc. is authorized to be created and will manage the ranch with guidance from the Fish and Wildlife Conservation Commission and the Department of Agriculture and Consumer Services.

HB 1533 Petroleum Contamination

At a site where underground storage tanks will be upgraded pursuant to Rule 62-761 of the *Florida Administrative Code*, subsequently discovered discharges occurring before the upgrade has taken place will be presumed to be part of the original discharge; both will qualify for state funding. There are, however, certain conditions where this presumption does not apply. The petroleum facility operator must report all discharges and provide copies of storage tank test results according to DEP rules.

HB 1249 Funding for Oyster Management and Restoration Programs

This measure modifies funding for oyster management restoration in Apalachicola Bay and other state areas where oysters are harvested. The bill removes the fifty cents per bag surcharge paid by the wholesale dealer on oysters harvested from Apalachicola Bay and replaces it with income from the excise tax on documents. An annual transfer of \$300,000 from the General Inspection Trust Fund in the Department of Agriculture and Consumer Services to the State Treasury will now provide the necessary funding.

HB 1039 Miami-Dade County Lake Belt

This enactment adds back lands previously excluded from the Lake Belt Area, redefines boundaries for mining area subject to mitigation fees, and provides a schedule for fee increases. The current fee of five cents per ton will increase to twelve cents on January 1, 2007, eighteen cents in 2008, and twenty-four cents in 2009. For upgrades of water treatment plants which treat water coming from Northwest Wellfield in Miami-Dade County, a similar mitigation fee is imposed on mined limerock and sand. As of January 1, 2007 the fee collected will be fifteen cents per ton; it will only be collected until enough money is raised to design and construct the plant. The use of mitigation funds is expanded to now include reimbursement to the South Florida Water Management District and Miami-Dade County for certain land purchases.

HB 471 Fish and Wildlife

In an attempt to provide consistency among similar freshwater fish, saltwater fish, and hunting and wildlife violations, this bill creates a framework of proposed penalties, including a sliding scale of mandatory fines and sentences and increases for repeat offenders. Additionally, it creates the Wildlife Violators Compact, permitting Florida to take part in a national effort to ensure compliance with fish and wildlife laws. This is achieved through measures such as reciprocal recognition of license suspensions between Compact states. Further, a hunter mentoring program was created, allowing a one-year waiver for hunting licenses. The minimum number of hours for a hunter safety course has been repealed.

HB 265 Hunting Lands

The Fish and Wildlife Conservation Commission is required to open all commission managed lands to hunting except when reasons of public safety, fish and wildlife management, homeland security, and other legal prohibitions would prohibit doing so. The commission, with the aid of state agencies or water management districts owning or managing lands, must expeditiously open new hunting acreage to replace closures.

HB 1359 Hazard Mitigation for Coastal Redevelopment

This bill provides direction for local governments and their comprehensive plans to increase population densities in Coastal High Hazard Areas (CHHA), defined as an area below the eleva-

tion of a category one storm surge line. It requires the Division of Emergency Management to update hurricane evacuation studies. By July 1, 2008 local governments are required to amend their future land use map and coastal land use element to include the new CHHA definition and CHHA map. Furthermore, this bill makes the Department of Health's authority to issue a permit to construct or repair onsite sewage treatment and disposal systems seaward of the coastal construction line contingent on the receipt of a DEP permit.

HB 1015 Agricultural Economic Development

House Bill 1015 allows landowners of "agricultural enclaves" to apply for an amendment to a local government's comprehensive plan to permit land uses and intensities of use consistent with those of surrounding industrial, commercial, or residential areas. An agricultural enclave is an area which is no larger than 1000 acres, has been in agricultural production for the past five years, and meets Greenbelt criteria. Additionally, this legislation requires that water management districts enter into agreements with the Department of Agriculture and Consumer Services to allow the department to review existing or proposed activities to determine if they qualify for the agricultural exemption to the Environmental Resource Permitting Program.

HB 1299 Areas of Critical State Concern

This bill permits counties that were designated as areas of critical state concern for at least twenty consecutive years to continue to impose the previous tourist taxes and use local government surtaxes for twenty years after the designation is removed. The bill creates a new process for removing the Florida Keys as an area of critical state concern, and sets the date of removal for October 1, 2009 unless certain goals have not been achieved.

HB 7163 Environmental Resource Permitting in Northwest Florida Water Management District

The DEP and the Northwest Florida Water Management District are now authorized to enter into operating agreements and implement the Environmental Resource Permitting (ERP) Program in Florida's panhandle. The bill directs the DEP and the District to begin rulemaking to regulate stormwater management systems, surface water management, and storage within sixty days

after the bill became effective; however, the new rules will not go into effect until January 1, 2007 and 2008, respectively. The bill additionally requires the DEP and the department to streamline state and federal permitting requirements by using electronic permitting, field permitting, and certification programs for certain activities.

CS/CS/CS/HB 683 Development-of-Regional Impact (DRI) Reform

This bill makes large modifications to the DRI program. First, it exempts numerous facilities from DRI review, including marinas, hospitals, and chemical and petroleum facilities. Next, it has provisions allowing developers of now exempt properties to either continue under their existing DRI agreement or rescind the agreement. This legislation also creates more flexibility for build out dates, allowing DRI orders to reflect the date “anticipated” rather than “required” to complete the project. Further, it clarifies methods for the Department of Community Affairs and adversely affected parties to challenge a DRI development order as being inconsistent with a local comprehensive plan. House Bill 683 also provides new incentives for the development of “affordable workforce housing.”

SB 1948 Coastal Properties Disclosure Statements

This legislation requires that prospective purchasers of coastal real estate, located seaward of the coastal construction line, be provided with an additional disclosure. The statement must indicate that the property is subject to erosion and is governed by federal, state, and local regulations. However, failure to provide this statement, will not preclude enforcement of the sale of the property.

HB 1155 Contaminated Drycleaning Facilities

House Bill 1155 allows owners of drycleaning facilities where a contamination accident occurred before January 1, 1975 to take advantage of the since shut-down Drycleaning Solvent Cleanup Program. While the program originally required the filing of an application prior to 1999, this bill allows for state funded cleanup regardless of whether a timely application was filed.

HB 1567 Eminent Domain

This bill is the Florida legislature's response to last year's U.S. Supreme Court decision in *Kelo v. City of New London*. In that case, the Court found the taking of property for economic development by a private entity to be constitutional, essentially affirming an expansive reading of the Takings Clause.¹⁰⁹ Through this legislation, Florida has chosen to place limitations on its use of eminent domain law by restricting some transfers of land to certain persons and private entities. Also, it provides that the elimination of a slum or blighted area does not meet the state constitutional requirement that the taking be for a public purpose.

109. *Kelo v. City of New London*, 545 U.S. 469, 125 S.Ct. 2655 (2005).