THE CO-EVOLUTION OF SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL JUSTICE: COOPERATION, THEN COMPETITION, THEN CONFLICT

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INTRODUCTION

Among the fields of law, the evolution of environmental law stands out as fast-paced and tumultuous, experiencing dramatic changes of emphasis in what would be lightening-quick time frames for many other areas of legal practice. I had the pleasure of covering two rapidly emerging themes of environmental law's evolution in an earlier issue of this journal. I traced the histories of sustainable development[1] and environmental justice[2], and concluded that each was

* Professor of Law, Southern Illinois University School of Law, Carbondale, Illinois, and Visiting Associate Professor of Law (1998-99), George Washington University Law School, Washington, D.C. Please direct questions or comments to jruhl@main.nlc.gwu.edu. I apologize up front for repeated references to other works I have authored on the topics of complexity theory, the Endangered Species Act, and sustainable development. It is not an exercise in self-promotion. Rather, the occasion to write this article prompted me to synthesize several themes appearing in these other works, and I offer the citations merely for anyone interested in further background on the topics covered. This article may be accessed via the World-Wide Web at <http://www.law.duke.edu/journals/9DELPFRuhl>.

1. My working definition of sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." WORLD COMM'N ON ENV'T & DEV., OUR COMMON FUTURE 43 (1987). At its broadest, sustainable development is the philosophy that today's progress must not come at tomorrow's expense and that human progress thus must be sustained not just in a few places for a few years, but for the entire planet into the distant future. *See* Jonathan Lash, *Toward a Sustainable Future*, 12 NAT. RESOURCES & ENV'T 83, 83 (1997). Only recently have policy makers and commentators begun to hash out the legal framework for implementing sustainable development as a principle of governance rather than merely one of philosophy. *See* John C. Dernbach, *Sustainable Development as a Framework for National Governance*, 49 CASE W. RES. L. REV. 1, 85-90 (1998). For thorough bibliographies of sustainable development literature, *see* ENVIRONMENTAL ISSUES AND SUSTAINABLE FUTURES: A CRITICAL GUIDE TO RECENT BOOKS, REPORTS, AND PERIODICALS (Michael Marien ed., 1996); Keith Pezzoli, *Sustainable Development Literature: A Transdisciplinary Bibliography*, 40 J. ENVTL. PLANNING & MGMT. 575 (1997).

2. My working definition of environmental justice is the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." U.S. Environmental Protection Agency, Office of Federal Activities, *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*

on the brink of moving into the advanced stage of evolution at which there is "hard law" to apply the policies to real-world situations.[3] My main objective was to demonstrate how new policy ideas evolve into real-world law, and sustainable development and environmental justice provide currently unfolding examples following strikingly similar pathways of development. In that exposition, however, the manner in which I treated the two concepts made it appear as though they had evolved and would continue to evolve on parallel, but largely independent, paths toward relevance in the hard law sense. Only in passing did I suggest that "[i]t is quite possible … that the law of sustainable development will eventually catch up with and then subsume the law of environmental justice, as social equity is the important third leg of sustainable development policy."[4]

The occasion of this symposium issue has led me to consider more deliberately the connection between sustainable development and environmental justice. Clearly, sustainable development and environmental justice, whatever they mean today and wherever they are heading, have not evolved and are not evolving in separate bubbles. But how are they related? Are they mutually reinforcing developments, and if so, are they exclusively so? Or is there the potential for tension between the two policies as they develop into legal doctrines? Does the fact that many proponents of sustainable development support the environmental justice movement, and vice versa, mean that they always will?

These are questions about the *co-evolution* of sustainable development and environmental justice, rather than simply the evolution of each separately. Not all emerging legal policies necessarily co-evolve in readily discernable patterns; for example, it may be difficult

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(visited Oct. 19, 1998) <http://es.epa.gov/oeca/ofa/ejepa.html>(explaining how EPA will include environmental justice factors in environmental impact statements). The topic of environmental justice, and whether environmental *injustice* truly exists, has exploded in the last decade into legal and social commentary. *See, e.g.*, CHRISTOPHER H. FOREMAN, JR., THE PROMISE AND PERIL OF ENVIRONMENTAL JUSTICE (1998); DAVID E. NEWTON, ENVIRONMENTAL JUSTICE: A REFERENCE HANDBOOK (1996); KENNETH A. MANASTER, ENVIRONMENTAL PROTECTION AND JUSTICE (1995); Symposium, *Urban Environmental Justice*, 21 FORDHAM URB. L.J. 431 (1994); Symposium, *Race, Class, and Environmental Justice*, 63 U. COLO. L. REV. 839 (1992). For thorough bibliographies of environmental justice literature, see Carita Shanklin, *Pathfinder: Environmental Justice*, 24 ECOLOGY L.Q. 333 (1997); Adam D. Schwartz, *The Law of Environmental Justice: A Research Pathfinder*, 25 Envtl. L. Rep. (Envtl. L. Inst.) 10,543 (1995).

3. *See* J. B. Ruhl, *The Seven Degrees of Relevance: Why Should Real-World Environmental Attorneys Care Now About Sustainable Development Policy?*, 8 DUKE ENVTL. L. & POL'Y F. 273 (1998).

4. *Id.* at 291 n.52. The other two legs are economy and environment. *See id.* at 278.

to find any co-evolutionary links between emerging policies in sports law and environmental justice law. However, even on a superficial level, sustainable development and environmental justice seem inexorably linked by common themes of environmental quality and social equity. Yet sustainable development clearly is larger than environmental justice in terms of the scope of policies, stakeholders, and complexities involved, and environmental justice clearly is focused on its more narrow agenda with an intensity not found in sustainable development. The two policies do not overlap completely in terms of either scope or focus. They are not interchangeable.

Hence, while my prior analysis of the two emerging policies focused on their similarities in terms of evolution from policy to hard law, it strikes me on reflection that the really interesting questions focus on their *differences*. To emphasize the co-evolutionary nature of the two policies and how their differences influence that process, I borrow from principles of evolution developed in the more technical fields of biological evolution and complexity theory.[5] Although these principles apply to some extent only metaphorically—law, after all, is not a biological organism—in many ways law evolves through forces quite familiar to evolutionary analysis applied in other disciplines.[6] Law is a complex adaptive system in the truest sense of the term.[7]

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5. Complexity theory refers to the body of literature and research devoted to "the study of the behavior of macroscopic collections of [interacting] units that are endowed with the potential to evolve in time." PETER COVENEY & ROGER HIGHFIELD, FRONTIERS OF COMPLEXITY 7 (1995). Although the study of such complex adaptive systems can be quite technical in substance, many of the recent and most influential works in the field focus on applications of the technical theory to real world phenomena, such as biological evolution. *See, e.g.*, MURRAY GELL-MANN, THE QUARK AND THE JAGUAR (1994); STUART KAUFFMAN, AT HOME IN THE UNIVERSE: THE SEARCH FOR LAWS OF SELF-ORGANIZATION AND COMPLEXITY (1995); JOHN L. CASTI, COMPLEXIFICATION: EXPLAINING THE PARADOXICAL WORLD THROUGH THE SCIENCE OF SURPRISE (1994); JACK COHEN & IAN STEWART, THE COLLAPSE OF CHAOS (1994); BRIAN GOODWIN, HOW THE LEOPARD CHANGED ITS SPOTS: THE EVOLUTION OF COMPLEXITY (1994); JOHN HOLLAND, EMERGENCE: FROM CHAOS TO ORDER (1998). For histories of the development of complexity theory and the important role the Santa Fe Institute has played in complex systems research, see ROGER LEWIN, COMPLEXITY: LIFE AT THE EDGE OF CHAOS 8-22 (1992); M. MITCHELL WALDROP, COMPLEXITY (1992); JAMES GLEICK, CHAOS: MAKING A NEW SCIENCE 3-8 (1987). Current information about the field is best obtained from the journal *Complexity*.

6. For an overview of evolutionary theories of law, with a special emphasis on the application of complexity theory, see J. B. Ruhl, *The Fitness of Law: Using Complexity Theory to Describe the Evolution of Law and Society and Its Practical Meaning for Democracy*, 49 VAND. L. REV. 1407 (1996).

7. For a general description of the behavior of legal systems using concepts from complexity theory, see 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).

Thus, sustainable development and environmental justice can be expected to exhibit co-evolutionary patterns and relations that can be explained by using concepts being developed through complex systems research.[8]

Part I of this Essay outlines the most important complex systems concepts for purposes of analyzing the sustainable development/environmental justice co-evolutionary system. Co-evolutionary systems exhibit basic behaviors such as cooperation, competition, and conflict as strategies for coping with complex positive and negative feedback effects between systems. Because what one system does affects both the others and itself, the success of any participant in a co-evolutionary system depends in large part on the adaptability of its "design"—how it is set up to respond to "moves" by its co-evolutionary kin. When legal policies co-evolve, each vying for prominence, legitimacy, support, and other real-world indicia of legal significance, they undoubtedly execute and respond to the basic co-evolutionary strategies of cooperation, competition, and conflict.

Part II of the Essay grounds that theme of legal policy co-evolution in the practical context of sustainable development and environmental justice. To begin that discussion, I use an example from the recent past to illustrate how a similarly-situated pair of environmental policies have co-evolved. The modern environmental movement in the United States emerged in the 1970s under a broad umbrella of environmentalism,[9] which replaced resourcism[10] as the

8. For some thoughts on how the development of environmental policy generally behaves and evolves as a complex adaptive system, see 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).

9. Environmentalism is increasingly hard to define in a way that distinguishes those who believe in it as a policy versus those who do not. Public opinion polls show that Americans who say they care about the environment have grown in number steadily through 1991, to over 60% of the population, and have plateaued at a level at which environmentalism can be considered "mainstream." Nevertheless, only a small fraction of those "environmentalists" actively make environmentalism their way of life through dedicated recycling, composting, water conservation, xeriscape, and so on. *See, e.g.*, Tibbett L. Speer, *Growing the Green Market*, AM. DEMOGRAPHICS, Aug. 1997, at 45; Peter Stisser, *A Deeper Shade of Green*, AM. DEMOGRAPHICS, Mar. 1994, at 24. *See also* Traci Watson, *For Most Americans, It's not Easy Being Green*, USA TODAY, Apr. 22, 1998, at 3A. Perhaps the best way of defining environmentalism, therefore, is by process of elimination: i.e., it is neither utilitarian-oriented resourcism, see *infra* note 10, nor biocentric-oriented Deep Ecology, see *infra* note 11, but rather something in between—what I will call mainstream environmentalism.

10. I use the term resourcism as a shorthand for the policy position that advocates reliance on free-market forces, well-defined property rights, and cost-benefit analysis as the principal mechanism for directing resource consumption and environmental protection policies, based on the theory that resource owners will be driven by the profit motive to balance resource exploi-

dominant theme of environmental policy. An important component of environmentalism as it emerged out of the euphoria of the first Earth Day was the Deep Ecology movement - an ardent, ideological, fervent, yet ultimately small movement of deeply committed preservationists whose intensity fueled the early advancement of environmentalism.[11] Over time, however, the cooperation between environmentalism and Deep Ecology waned, yielding eventually to competition and then—the current state of affairs—to open conflict. Deep Ecology helped environmentalism get off the ground, energized its early victories, and then was left in the dust. Today, *mainstream* environmentalism has little tolerance for the extremism of Deep Ecology.

After that retrospective case study, Part II of the Essay turns attention to the future of co-evolution between environmental justice and sustainable development. My working thesis is that environmental justice is to sustainable development what Deep Ecology was to mainstream environmentalism. Sustainable development policy feeds off of the intensely focused rhetoric of environmental justice, incorporating equity concerns as a key leg of sustainable development's environment-economy-equity policy triad. But this cooperation will not last. Environmental justice, as a discrete policy agenda, is simply too narrow, too ideological, and too unyielding to survive intact in the more adaptive sustainable development agenda. As environmentalism did relative to Deep Ecology, sustainable develop-

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tation and conservation at economically efficient levels over the short and long runs. *See* J. Baird Callicott & Karen Mumford, *Ecological Sustainability as a Conservation Concept*, 11 CONSERVATION BIOLOGY 32, 34 (1997)(identifying "resourcism" as one of the philosophies of environmental policy that dominated the first three quarters of the twentieth century). One of the leading advocates of an extreme version of this utilitarian, anthropocentric approach was the late economist Julian Simon, who contended that technological advances, spurred by the profit motive, would prevent rising consumption from depleting and destroying natural resources. *See, e.g.*, Julian L. Simon, *Resources, Population, Environment: An Oversupply of False Bad News*, 208 SCI. 1431 (1980). For more current versions of the policy, see, for example, TERRY L. ANDERSON & DONALD R. LEAL, FREE MARKET ENVIRONMENTALISM (1991); RICHARD A. EPSTEIN, SIMPLE RULES FOR A COMPLEX WORLD (1995).

11. Deep Ecology represents the most transformative-minded brand of environmental policy, highly biocentric in orientation and deeply committed to the singular goal of environmental preservation. Its defining work is JAMES LOVELOCK, THE AGES OF GAIA: A BIOGRAPHY OF OUR LIVING EARTH (1988); Bill Devall, *The Deep Ecology Movement*, 20 NAT. RESOURCES J. 299 (1980). Speer's and Stisser's demographic frameworks, *see supra* note 9, characterize Deep Ecology believers as among the "True Blue Greens" who eat, breathe, and drink environmental preservation. They are personified today at the extreme perhaps best by Julia "Butterfly" Hill, who has lived more than one year 180-feet high in a 1000-year old redwood tree which she has named Luna, in order to prevent the tree from being felled for lumber. *See, e.g.*, James Brooke, *Redwoods Still Inspire Sturdiest of Defenders*, NEW YORK TIMES, March 28, 1998 at A6; Lunatree, *Luna*, (visited Dec. 12, 1998) <http://www.lunatree.org>.

ment will eventually win a dominant position through strategies of competition and open conflict directed at more narrowly-constructed policies such as environmental justice. Along the way, of course, sustainable development will have adopted many key items in the environmental justice agenda—i.e., the cooperation strategy of successful adaptation—but those components will appear as part of the sustainable development lexicon and toolbox, not as environmental justice policies.

I. CO-EVOLUTIONARY STRATEGIES IN LEGAL SYSTEMS

The rapidly developing discipline of complexity theory—the field of research focusing on dynamic systems that are complex, adaptive, and evolutionary—offers many new insights into how such systems co-evolve. Two key co-evolutionary design properties of such systems are (1) their focus on multi-trait optimization goals rather than single-trait maximization goals and (2) the mix of cooperation, competition, and conflict they adopt in their adaptive, evolutionary decision-making strategies. These properties define how complex adaptive systems, including legal systems, will seek to maintain fitness in their environments, and how successful they will be at doing so.[12]

12. For an extended and more technical discussion of these properties, and how they may be useful in the study of evolution of legal systems, see Ruhl, *supra* note 6, at 1437-67. For similar treatments of law using complexity theory or related concepts, see generally Hope M. Babcock, *Democracy's Discontent in a Complex World: Can Avalanches, Sandpiles, and Finches Optimize Michael Sandel's Civic Republican Community?*, 85 GEO. L.J. 2085 (1997) (critiquing civic republican political theory using complex systems principles); Vincent Di Lorenzo, *Complexity and Legislative Signatures: Lending Discrimination Laws as a Test Case*, 12 J. L. & POL. 637 (1996) (using chaos theory to evaluate the legislative response to alleged lending discrimination); Thomas Earl Geu, *Chaos, Complexity, and Coevolution: The Web of Law, Management Theory, and Law Related Services at the Millennium*, 65 TENN. L. REV. 925 (1998) (discussing complexity theory in the concept of corporate structure, management, and law). *See also* Vincent Di Lorenzo, *Legislative Chaos: An Exploratory Study*, 12 YALE L. & POL'Y REV. 425, 432-35 (1994) (developing a model for legislative decision making based on chaos theory); Gerald Andrews Emison, *The Potential for Unconventional Progress: Complex Adaptive Systems and Environmental Quality Policy*, 7 DUKE ENVTL. L. & POL'Y F. 167, 192 (1996) (applying to ecological protection issues); Thomas Earl Geu, *The Tao of Jurisprudence: Chaos, Brain Science, Synchronicity, and the Law*, 61 TENN. L. REV. 933, 934-35 (1994) (discussing the potential significance of chaos and emergence to legal theory); Andrew W. Hayes, *An Introduction to Chaos and Law*, 60 UMKC L. REV. 751, 764-73 (1992) (containing a general discussion of chaos theory and its application to judicial decision making); Jeff L. Lewin, *The Genesis and Evolution of Legal Uncertainty About "Reasonable Medical Certainty"*, 57 MD. L. REV. 380, 389-94 (1998) (describing the evolution of the tort doctrine of "reasonable medical certainty" using complex systems principles); Mark J. Roe, *Chaos and Evolution in Law and Economics*, 109 HARV. L. REV. 641, 643-65 (1996) (describing legal evolution according to path dependence theory and chaotic systems theory); Robert E. Scott, *Chaos Theory*

A. *Multi-Trait Optimization vs. Single-Trait Maximization*

One of the core elements of complexity theory is the description of the design difficulties that exist in systems, given that they are composed of a diversity of "traits" exhibiting a correspondingly complex diversity of relationships. Improving the performance of any one trait to approach its maximal performance capacities can have disastrous effects on other traits in the system and thus on the system as a whole. Complexity theory research suggests that within any complex adaptive system "conflicting constraints" exist between different possible combinations of components' structural traits.[13] These constraints limit the degree to which any one trait can be "improved" without causing failure or degradation of another trait. The system must take all other traits into consideration when evaluating the ef-

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and the Justice Paradox, 35 WM. & MARY L. REV. 329, 329-31 (1993) (applying chaos theory to the legal dilemma between "present justice" and "future justice"); Kenton K. Yee, *Coevolution of Law and Culture: A Coevolutionary Games Approach*, COMPLEXITY, Jan.-Feb. 1997, at 4 (describing attempts to mathematically model evolution of common law according to complex adaptive systems dynamics).

Several other works discuss complexity theory or its branches, in specific legal settings, albeit sometimes very briefly. *See* Lawrence A. Cunningham, *Capital Market Theory, Mandatory Disclosure, and Price Discovery*, 51 WASH. & LEE L. REV. 843, 854-59 (1994) (applying chaos theory to capital market regulation); Lawrence A. Cunningham, *From Random Walks to Chaotic Crashes: The Linear Genealogy of the Efficient Capital Market Hypothesis*, 62 GEO. WASH. L. REV. 546, 581-92 (1994) (discussing the application of chaos theory to capital market regulation); Michael J. Gerhardt, *The Role of Precedent in Constitutional Decision Making and Theory*, 60 GEO. WASH. L. REV. 68, 114-15 (1991) (explaining Supreme Court constitutional jurisprudence using, among other mediums, a discussion of chaos theory); Alistair M. Hanna, *The Land Use System*, 13 PACE ENVTL. L. REV. 531, 538 (1996) (discussing application of chaos theory and self-organization theory to a land use regulation system); Glenn Harlan Reynolds, *Is Democracy Like Sex?*, 48 VAND. L. REV. 1635, 1641-42 (1995) (discussing the anti-parasitic effect of evolutionary processes as an analogy to democratic processes); Glenn Harlan Reynolds, *Chaos and the Court*, 91 COLUM. L. REV. 110, 112-15 (1991) (explaining Supreme Court constitutional jurisprudence using chaos theory); William H. Rodgers, Jr., *Where Environmental Law and Biology Meet: Of Pandas' Thumbs, Statutory Sleepers, and Effective Law*, 65 U. COLO. L. REV. 25, 46-48 (1993) (discussing chaos theory surfacing in evolutionary biology commentary as a metaphor for evolution of environmental law); *see also* MICHEL VAN DE KERCHOVE & FRANCOIS OST, LEGAL SYSTEM BETWEEN ORDER AND DISORDER 102-77 (Iain Stewart trans., Oxford University Press 1994) (discussing order-disorder tensions in legal systems); Eric Kades, *The Laws of Complexity and the Complexity of Laws: The Implications of Computational Complexity Theory for the Law*, 49 RUTGERS L. REV. 403, 452-54, 476 (1997) (focusing on mathematically complex issues as they arise in law, such as cyclical priority issues in liens and property titles); Lynn M. LoPucki, *The Systems Approach to Law*, 82 CORNELL L. REV. 479, 480-82 (1997) (advocating an empiricist "systems approach" to legal analysis). *See generally* Randal C. Picker, *Simple Games in a Complex World: A Generative Approach to the Adoption of Norms*, 64 U. CHI. L. REV. 1225 (1997) (using computational theories to examine norm competition).

13. *See* KAUFFMAN, *supra* note 5, at 169-73 (using a model of a genomic network to show that the more interconnected genes are, the more likely it is that conflicting constraints will exist).

fects of changing one trait on the overall fitness of the system.

Thus, we can envision a landscape of varying fitness level potentials for the system in a given environment with peaks, valleys, and plains of the landscape representing the fitness potential of different combinations of system traits.[14] Indeed, we can construct such a fitness landscape for any system of connected interactions. The presence of such conflicting constraints may make the landscape flat with few high spots, or rugged and multipeaked.[15] Much of complex systems research is aimed at defining systems' fitness landscapes and understanding how they evolve across them.[16] Each system's objective is to maintain optimum levels of fitness over the long run, even if that means avoiding maximization of single-trait fitness opportunities in favor of maintaining above average long-term performance for the system as a whole.

Legal systems can be characterized according to their choice of a single-trait maximization versus a multi-trait optimization approach. For example, the inter-branch checks and balances and federalist structure of the Constitution suggest a multi-trait, long-term optimization framework, whereas the formation of highly specialized and centralized federal administrative agencies in the latter part of this century can be viewed as a proliferation of single-trait maximization systems.[17] Within the body of environmental law, examples abound of single-trait maximization laws that so elevate a primary goal above all others, such as protection of endangered species, they experience difficulty managing other traits that necessarily are part of the system, such as private property rights.[18] We must stay aware of the consequences of designing laws that attempt to maximize the performance of a particular social or legal attribute, thereby sacrificing the performance of other social and legal goals.

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14. *See id*. at 26 (relating that biologists envision "fitness landscapes, where the peaks represent high fitness, and populations wander . . . across the landscape seeking peaks, but perhaps never achieving them").

15. In the field of evolutionary biology, for example, Kauffman states that:

> [a]daptation is usually thought of as a process of "hill climbing" through minor variations toward "peaks" of high fitness on a fitness landscape. And natural selection is thought of as "pulling" an adapting population towards such peaks. We can imagine a mountain range on which populations of organisms . . . are feeling their way to the summits.

Id. at 154.

16. Complex systems researchers view evolution in any system as "an attempt to solve a complex optimization problem." COVENEY & HIGHFIELD, *supra* note 5, at 118.

17. *See* Ruhl, *supra* note 6, at 1467-74.

18. *See* Ruhl, *supra* note 8, at 968-79.

B. *Strategies of Cooperation, Competition, and Conflict*

The fitness landscape model used in complexity theory offers some insights into co-evolutionary environments, such as that of evolving biological systems. As one system (e.g., a species) evolves across its fitness landscape, it necessarily changes the fitness landscapes of other systems with which it interacts and prompts them to make evolutionary moves as well.[19] Thus the fitness landscape model, because of the static image a landscape implies, does not present the whole picture.[20] As one system travels across its seemingly static fitness landscape, its travels necessarily alter the fitness landscapes of other systems; in turn, changes in those systems alter the fitness landscape of the former system. In other words, there is a feedback relationship, or coupling property, between all co-evolving systems. Fitness landscapes of various coupled systems are linked by their temporal feedback interactions and require that all linked systems reconstruct their evolutionary strategies continually—a sort of perpetual exercise in game theory.[21]

Systems cope with their couplings to other systems' evolutions through strategies of cooperation, competition, and conflict. The "survival of the fittest" popularization of evolutionary biology makes us think first of competition between species that is "predicated upon collective demand for a common resource when the available supply is inadequate for all of the organisms."[22] Competition may take the form of active conflict, but it does not necessarily require that two

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19. Hence the problem for adaptive systems is that, while the process of adaptation inherent in the "survival of the fittest" conception of evolution is designed to lead to ever-increasing improvements, all other systems competing for the same scarce resources are adapting. Finding the optimal condition thus requires strategies designed to take into account competing systems' anticipated adaptations. KAUFFMAN, *supra* note 5, at 119-26, 247-59.

20. As Kauffman explains:

> [t]he idealization we have used [thus far] that fitness landscapes are fixed and unchanging is false. Fitness landscapes change because the environment changes. And the fitness landscape of one species changes because the other species that form its niche themselves adapt on their own fitness landscapes. Bat and frog, predator and prey, coevolve. Each adaptive move by the bats deforms the landscape of the frogs.

Id. at 208.

21. *See id.* at 217-21. Kauffman notes that in a single game of the famous "Prisoners Dilemma," the rational strategy of the two independent agents is defect-defect, but that in a repeated game different strategies emerge as the independent agents come to understand the coordinated nature of their choices. This effect, posits Kauffman, provides an analogy to the coevolution of fitness landscapes, though coevolution in biological organisms takes place without conscious predecision. *See id.*

22. Robert McIntosh, *Competition: Historical Perspectives*, *in* KEYWORDS OF EVOLUTIONARY BIOLOGY 67 (Evelyn Fox Keller & Elisabeth A. Lloyd eds., 1992).

species combat over the same morsel of food.[23] On the other hand, systems on a collision course need not always resort to either open conflict or passive competition, as tacit or explicit compromises may assure two systems' mutual survival instead of each risking its own demise in all-out warfare.[24] Thus, systems locked in co-evolutionary relations adopt shifting blends of cooperation, competition, and conflict to maintain fitness in a constantly changing evolutionary environment.[25]

Legal systems also experience co-evolutionary effects with other social, economic, and legal systems. For example, modern environmental law made great strides through so-called "command-and-control" approaches when direct intervention in free-wheeling resourcist policies proved highly effective in altering social and economic behaviors considered damaging to the environment.[26] In the long run, however, that approach ossified into a static set of rules

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23. *See* JONATHAN WEINER, THE BEAK OF THE FINCH: A STORY OF EVOLUTION IN OUR TIME 142 (1995) ("Even if [two species] never actually jostle and joust, never once collide physically over a . . . seed or a nesting site . . . , natural selection will gradually magnify their differences.").

24. For example, through ecological displacement—species yielding part of an environment to competitors—more species can be accommodated, the overall diversity of the environment rises, and as a result all cooperating species may prosper more than under an active conflict or passive competition regime. *See generally* Evelyn Strauss, *Mutual Nonaggression Pact May Aid Ant Spread*, 282 SCI. 854 (1998) (describing the discovery of a species of ant whose colonies cooperate in order to maximize their respective fitness over other competing species of ants).

The preeminent biologist Edward O. Wilson explains that an ecological "community shifts continuously, and by an unconscious trial and error, through innumerable fits and starts, its biodiversity slowly rises. Species excluded earlier at last find room, symbiotic pairs and trios are fitted together, the forest grows deeper and richer, new niches are prepared. The community thus approaches a mature state, actually a dynamic equilibrium with species forever arriving and disappearing and the total species numbers bobbing up and down inside narrow limits." EDWARD O. WILSON, THE DIVERSITY OF LIFE 172-73 (1992). Wilson's model of ecosystems is precisely the complexity theory model of a dynamical system's co-evolutionary transition towards the region of complexity. For example, Kauffman explores the issue of "community assembly" as one of co-evolution of fitness landscapes which produces a "'community landscape', in which each point of the terrain represents a different combination of species [and] . . . the peaks will represent points of high fitness—combinations that are stable." KAUFFMAN, *supra* note 5, at 211-14.

25. Gell-Mann posits that "[a]lthough competition among schemata is a characteristic of complex adaptive systems, the systems themselves may indulge in a mixture of competition and cooperation in their interactions with one another. It is often beneficial for complex adaptive systems to join together to form a collective entity that also functions as a complex adaptive system … ." GELL-MANN, *supra* note 5, at 242. Ecosystems are an example, see WEINER, *supra* note 23, at 200-02, and another might be "when individuals and firms in an economy operate under a government that regulates their behavior in order to promote values important to the community as a whole." GELL-MANN, *supra* note 5, at 242.

26. *See* Ruhl, *supra* note 6, at 1456-62.

administered by entrenched federal bureaucracies allowing economic and social interests to evolve around environmental law to the point at which today we find ourselves confronted with problems of the environment that appear intractable to the system that once seemed so powerful.[27] Hence, in order to engage environmental law in that co-evolutionary process, we must design it—as we must any body of law—as a complex adaptive system.[28]

II. STUDIES IN CO-EVOLUTION OF ENVIRONMENTAL POLICIES

Categorizing and grouping environmental policy approaches as I have—resourcism, mainstream environmentalism, and Deep Ecology; sustainable development and environmental justice—overstates the degree to which they comprise discrete and mutually exclusive "camps" of ideology. All of these approaches share the common trait of attempting to define how humans should behave toward the environment. Each offers a problem-solving strategy and a design for implementing it. The reason we think of them as different is because their strategies and designs for dealing with human behavior and the environment are different. But what are their strategies and designs for dealing *with each other*? How do they co-evolve?

Complexity theory tells us that these approaches can be categorized not only by how they differ in terms of policy toward the environment—e.g., biocentric versus anthropocentric; strong regulation versus free market—but also how they are constructed as adaptive systems. For example, Deep Ecology is single-minded in focus and strives to maximize immediate positions primarily through conflict. Deep Ecology advocates want it all, now. For them, anything less than total victory is total failure, hence they have devised strategies and designs focused on winning battles. By contrast, resourcism and mainstream environmentalism are more "one step at a time" in approach, in that they are designed to achieve long-term gains at relatively modest optimizing increments gained through a blend of cooperation, competition, and, where necessary, conflict. Co-evolution is what happens when many such varied approaches collide in cooperation, competition, and conflict.

The particular focus here is the co-evolution of the single-trait maximizing strategy found in environmental justice and the multi-trait optimizing strategy found in sustainable development. Al-

27. *See id.* at 1463-67.

28. *See* Ruhl, *supra* note 8, at 980-91.

though it is dangerous to assume history will repeat itself, a recent precedent shows how two closely associated but contrasting environmental policies have co-evolved. For Deep Ecology, a single-trait maximizing strategy if ever there was one, and the multi-trait optimization approach of mainstream environmentalism emerged together in the 1970s and have remained coupled ever since. To demonstrate how they co-evolved, I use a case study based on the Endangered Species Act of 1973 (ESA).[29] I then suggest that the same themes found in that story are playing out today in the co-evolution of environmental justice and sustainable development.

A. *The Endangered Species Act and the Rise and Fall of Deep Ecology at the Hands of Mainstream Environmentalism*

Amidst the flurry of federal environmental law enactments in the 1970s, considered by many as the dawn of modern American environmental law,[30] Deep Ecology arrived on the scene with a bang in the form of the Endangered Species Act. This extraordinary law "elevates the goal of conservation of … species above virtually all other considerations,"[31] a feature that, in 1973, made the ESA "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation."[32] Although the other laws enacted during the same time period clearly were meant to change the

29. *See generally* 16 U.S.C. §§ 1531-1544 (1994) (the Endangered Species Act). The case study is by no means intended to provide a comprehensive overview of the law, policy, and practice under the ESA. For that background see MICHAEL J. BEAN & MELANIE ROWLAND, THE EVOLUTION OF NATIONAL WILDLIFE LAW 193-276 (3d ed. 1997); RICHARD LITTELL, ENDANGERED AND OTHER PROTECTED SPECIES: FEDERAL LAW AND REGULATION 3-108 (1992); DANIEL J. ROHLF, THE ENDANGERED SPECIES ACT: A GUIDE TO ITS PROTECTIONS AND IMPLEMENTATION (1989).

30. Described as the "explosion of environmental law," from 1970 through 1976 in quick order Congress newly enacted or substantially amended ten major environmental regulation statutes covering air, water, and land pollution, project planning, workplace safety, manufacturing, species protection, and public drinking water. *See* J. William Futrell, *The History of Environmental Law, in* ENVIRONMENTAL LAW INSTITUTE, ENVIRONMENTAL LAW FROM RESOURCES TO RECOVERY § 1.2(I)(1)-(3), at 35-37 (1993) (collecting statutes); ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW SCIENCE, AND POLICY 106-110 (2d ed. 1996) (collecting statutes). That pace of new enactments was nearly duplicated during the same period in the field of natural resources protection. *See* Futrell, *supra*, § 1.2(I)(3), at 38-39 (collecting statutes). The process continued into the 1980s, albeit at a slower pace. *See* PERCIVAL, *supra*, at 111-12 (collecting statutes). Some laws were changed more than once in this period, each change boosting the degree of federal dominance. *See* John P. Dwyer, *The Practice of Federalism Under the Clean Air Act*, 54 MD. L. REV. 1183, 1183-85 (1995) (tracing changes to federal air pollution control legislation).

31. ROHLF, *supra* note 29, at 25.

32. Tennessee Valley Auth. v. Hill, 437 U.S. 153, 180 (1978).

playing field in terms of the role markets and property rights play in resource use decisions, these other laws contained numerous concessions to the cost-benefit approach of resourcism.[33] The ESA, by contrast, was single-minded in focus and unyielding in effect, earning it a reputation as the "pit bull of environmental law."[34] With only narrow exceptions, the ESA's prohibition of a "take"[35] of protected species applied everywhere and to everyone subject to United States jurisdiction.[36] In demanding terms, the ESA prevented federal agencies from causing or authorizing the extinction of species.[37] The ESA was closer to zero tolerance than any other major environmental law.[38] It was not about compromise, or incremental gains—it was about maximizing the goal of species conservation *above all else*.

The dichotomy between the ESA and most of the rest of the federal enactments was made plain by the event that marks the absolute high point of Deep Ecology in environmental law: the Supreme Court decision in *Tennessee Valley Authority (TVA) v. Hill*.[39] In that case, the Court halted the construction of a nearly complete federally-financed dam project because the federal agencies involved had not complied with the ESA.[40] When asked to refuse to enjoin the

33. For example, the promulgation of effluent discharge limitations under the Clean Water Act involved a complex series of cost-benefit analyses with increasingly more stringent outcomes phased in over time. *See generally* 33 U.S.C. §§ 1311-1314 (1994) (Clean Water Act). *See, e.g.*, E.I du Pont de Nemours & Co. v. Train, 430 U.S. 112 (1977); Jonathan K. Baum, *Legislating Cost-Benefit Analysis: The Federal Water Pollution Control Act Experience*, 9 COLUM. J. ENVTL. L. 75 (1983).

34. *See, e.g.*, Steven P. Quarles, *The Pit Bull Goes to School*, ENVTL. F., Sep.-Oct. 1998, at 55.

35. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 U.S.C. § 1532(19) (1994).

36. *See id.* § 1538(a)(1)(B). For an overview of the take prohibition as implemented, see, for example, Albert Gidari, *The Endangered Species Act: Impact of Section 9 on Private Landowners*, 24 ENVTL. L. 419 (1994); Frederico Cheever, *An Introduction to the Prohibition Against Takings in Section 9 of the Endangered Species Act of 1973: Learning to Live With A Powerful Species Preservation Law*, 62 U. COLO. L. REV. 109 (1991).

37. *See* 16 U.S.C. § 1536(a)(2) (1994). For an overview of the scope of federal agency duties with respect to species protected under the ESA, see BEAN & ROWLAND, *supra* note 29, at 235-65; LITTELL, *supra* note 29, at 47-63.

38. Because of this quality, "the act just didn't *look* like other legislation." CHARLES C. MANN & MARK L. PLUMMER, NOAH'S CHOICE: THE FUTURE OF ENDANGERED SPECIES 161 (1995) (emphasis in original). Although Congress may not have been aware of the ramifications of the ESA's different look, congressional staffers and others close to the drafting and enactment of the original version of the ESA have suggested that they both understood and intended the different look to carry the ESA where other laws enacted in the same time period had not ventured. *See id.* at 156-62.

39. 437 U.S. 153 (1978).

40. For a thorough history of the project and its fate under the ESA, including how Con-

construction as a matter of equity and common sense, the Court found that the ESA "admits of no exception"[41] and "indicates beyond doubt that Congress intended endangered species to be afforded the highest of priorities."[42] The Court refused to "make such fine utilitarian calculations" given that "Congress viewed the value of endangered species as 'incalculable.'"[43] Resourcism was dead; long live Deep Ecology.[44] But not for very long.

Until *TVA v. Hill*, Deep Ecology and mainstream environmentalism went largely hand in hand, cooperating to forge an alliance against resourcism and a new approach toward the environment. But *TVA v. Hill* made it clear that Deep Ecology was fundamentally not the same as mainstream environmentalism. Mainstream environmentalism is not about protecting the environment *above all else*. From its earliest days, mainstream environmentalism has accommodated economic and social conditions that preclude instantly maximized outcomes on behalf of the environment. For example, the Clean Water Act, one of the ESA's 1970s kin, still includes as a goal "that the discharge of pollutants into the navigable waters be eliminated by 1985,"[45] but nearly fifteen years after that deadline, there is no serious plan or hope that it will ever be achieved. Few people are willing to live the way it would take to achieve that goal in any immediate time frame. Indeed, most mainstream environmentalists would be horrified if required to live as Deep Ecologists would have them live.[46] But working one step at a time to address existing and

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gress later authorized finalization of the dam by special legislation and amended the ESA to create an exemption from the extinction prohibition, see MANN & PLUMMER, *supra* note 38, at 164-73.

41. 437 U.S. at 173.

42. *Id.* at 174.

43. *Id.* at 187.

44. The case has been described as a "ringing endorsement of the environmentalists' proposition (and the basis of their empowerment strategy) that if citizens are able to prove a statutory violation, the court must enforce the law without equitable balancing." ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 681-82 (2d ed. 1998). Indeed, after *TVA v. Hill* the ESA assumed cultural significance beyond environmental issues, as the term "endangered species" became a rhetorical device used in a variety of political and social settings when the speaker wished to emphasize the gravity of threats to a particular icon (e.g., family values, affordable homes, baseball) and the need to save it "at all costs." *See, e.g.*, John Copeland Nagle, *Endangered Species Wannabees*, 29 SETON HALL L. REV. 235 (1998).

45. 33 U.S.C. § 1251(a)(1) (1994).

46. Thus Speer and Stisser distinguish in their demographic breakdowns of attitudes between the "True Blue Greens"—those who truly practice Deep Ecology—and the much larger group of "Greenback Greens" who espouse environmentalism and support it through monetary contributions, but who live quite unlike True Blue Greens in terms of lifestyle commitment

new water pollution problems is a core value of mainstream environmentalism and a noble enough goal for most people to feel they have earned the badge of environmentalist.

Competition between the ESA and other environmental laws thus emerged in the 1980s, as the incrementalist approach of mainstream environmentalism required constant refinement and attention and thus demanded considerable legislative, administrative, and economic resources. Mainstream environmentalism could not offer significant concessions to the ESA and the win-at-all-costs agenda of Deep Ecology. To be sure, mainstream environmentalism did not openly contest Deep Ecology in this period; rather, the competition was a passive battle for the scarce resources of legislative and judicial power. For example, while the Hazardous and Solid Waste Amendments of 1984[47] and the Superfund Amendments and Reauthorization Act of 1986[48] substantially boosted the potency of hazardous waste management and remediation statutes enacted in the previous decade, the ESA made no great strides forward. In fact, the ESA was stripped of its "no tolerance" aura in 1982 when Congress added procedures for the approval of "incidental take" of protected species—i.e., permits to kill endangered species.[49] The ESA was beginning to look like any other environmental law.[50] Deep Ecology's voice was fading.

The 1990s have witnessed not merely passive competition, but outright conflict between Deep Ecology and mainstream environmental law, and Deep Ecology is losing.[51] In stark contrast to its de-

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to environmental preservation. *See generally* Speer, *supra* note 9; Stisser, *supra* note 9.

47. The Hazardous and Solid Waste Amendments of 1984, Pub. L. No. 98-616, 98 Stat. 3221 (1984).

48. Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (1986).

49. *See* BEAN & ROWLAND, *supra* note 29, at 229-35; LITTELL, *supra* note 29, at 70-73.

50. One commentator has hypothesized that this amendment, on its face a setback for the absolutist approach of the ESA, actually gave the ESA more influence in that landowners previously ignored the ESA take prohibition because there was no way to obtain a permit, whereas after the amendment there was some framework for providing permit authority and thus some incentive to work within the statute's requirements. *See* Michael J. Bean, *The Endangered Species Act and Private Land: Four Lessons Learned from the Past Quarter Century*, 28 Envtl. L. Rep. (Envtl. L. Inst.) 10,701, 10,708 (1998). To the extent this is an accurate assessment of landowner behavior, it suggests that the absolutist Deep Ecology approach may backfire by producing failures in implementation and compliance.

51. For example, recently parties and attorneys associated with the *TVA v. Hill* case gathered to recognize the twentieth anniversary of the decision, and to take stock of how the "little fish bites big dam" quality of the case may have limited what the decision could have meant to the Deep Ecology movement. *See* Janet Byron, *Snail darter saga still reverberates in Tennessee*, ENDANGERED SPECIES & WETLANDS REP., Dec. 1998, at 12, 12.

cision in *TVA v. Hill*, for example, the Supreme Court has limited the basis for Deep Ecology activists' standing under the ESA,[52] constrained the potency of the ESA's take prohibition by stiffening its burden of proof,[53] and opened the door to standing for economic interests injured by the application of the ESA's species protections.[54] Meanwhile, in Congress the ESA has become the whipping boy for a broad-based backlash against Deep Ecology in general.[55] In an effort not to lose the ground they have gained elsewhere, mainstream environmentalists openly endorse ESA reform designed to modernize the ESA with property owner incentives and other compromise-oriented tools.[56] Although mainstream environmentalists draw the line at the resurrection of resourcist measures which sacrifice species conservation goals, they will just as quickly draw the line at Deep Ecology's insistence for dramatically expanding the command-and-control legacy of the ESA.[57] Indeed, events have taken such a 180-degree turn that some of the most vocal critics of the ESA—that is, of its present manner of implementation—are the Deep Ecology believers.[58]

The co-evolution of Deep Ecology and mainstream environmentalism, as represented in the evolution of the ESA since 1973, has thus passed through three phases: cooperation in the 1970s, competition in the 1980s, and conflict in the 1990s. The process has not been as linear and steady as this oversimplified history of the ESA may suggest, but the trend has been unmistakable.[59] The lesson is that the

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52. *See* Lujan v. Defenders of Wildlife, 504 U.S. 555 (1992).

53. *See* Babbitt v. Sweet Home Chapter of Communities for a Great Oregon, 115 S. Ct. 2407 (1995).

54. *See* Bennett v. Spear, 117 S. Ct. 1154 (1997).

55. *See* Roger Platt, *Ships Passing in the Night: Current Prospects for Reauthorization of the Endangered Species Act*, ENDANGERED SPECIES UPDATE, Nov.-Dec. 1997, at 3, 5-6 (discussing the supporters and critics of the bipartisan Senate ESA reform bill).

56. For a summary of reform initiatives the Clinton Administration has adopted, for the most part with enthusiastic endorsement from mainstream environmental organizations, see J. B. Ruhl, *Who Needs Congress? An Agenda for Administrative Reform of the Endangered Species Act*, 6 N.Y.U. ENVTL. L.J. 367 (1998); *see also* PLATER ET AL., *supra* note 44, at 699-709.

57. For a discussion of the officers of the Environmental Defense Fund advocating several of the Clinton Administration's ESA reform measures, see Michael J. Bean & David S. Wilcove, *The Private Land Problem*, 11 CONSERVATION BIOLOGY 1 (1997); Michael J. Bean & David S. Wilcove, *Ending the Impasse*, ENVTL. F., July-Aug. 1996, at 22.

58. For example, the major critics of the Clinton Administration's ESA reform measures have been Deep Ecology groups. *See* Ruhl, *supra* note 56, at 386-87, 398.

59. *See generally* MARK DOWIE, LOSING GROUND (1995) (describing mainstream environmentalism generally as having deteriorated into polite, ineffectual activism marked by alliances with corporate philanthropists and government agencies, and calling for a new wave of environmental activism which, by all appearances, would be a combination of Deep Ecology and environmental justice). Recently, pie-wielding activist members of the Biotic Baking Bri-

broader, multi-trait optimization strategy of mainstream environmentalism dominated the co-evolution of the pair of policies. Mainstream environmentalism "cherry-picked" what worked from Deep Ecology, and then it moved on. When Deep Ecology thereafter challenged the mainstream environmentalism agenda, the latter prevailed because, rather than stake its entire environmental policy on maximizing one trait, mainstream environmentalism stayed focused on long-term optimization of fitness and used a blend of cooperation, competition, and conflict strategies to succeed.

B. *Tracing and Predicting the Co-Evolution of Sustainable Development and Environmental Justice*

As successful as mainstream environmentalism was at reshaping American environmental policy, it has itself become subsumed into a larger system: what is known today as sustainable development policy.[60] Mainstream environmentalism retained sharp boundaries between environment and economy, and hardly recognized social equity as a player in the evolution of environmental policy.[61] By contrast, sustainable development, as the "next generation" of environmental policy,[62] fuses environment, economy, and equity into one policy triad.[63] Sustainable development necessarily must borrow

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gade smeared Sierra Club president Carl Pope in the face with a pie, claiming he and the organization have turned against the ideals of the environmentalist movement. *See* Cesar G. Soviano, *American Pie*, USA TODAY, Nov. 17, 1998, at 1D.

60. For a more extensive discussion of the replacement of mainstream environmentalism with sustainable development as the dominant environmental policy, and of the multi-trait optimization focus of sustainable development in general, see J. B. Ruhl, *Sustainable Development: A Five-Dimensional Algorithm for Environmental Law*, 18 STAN. ENVTL. L. REV. 31 (1999).

61. *See* FOREMAN, *supra* note 2, at 1 ("Although environmentalists as individuals often sympathized with, and even actively supported, the political struggles of ethnic minorities (and African Americans in particular), environmentalism and civil rights/social welfare evolved as distinct issue spheres . . . . Environmentalism, especially at the national level, had little racial aspect as such."); Alice Kaswan, *Environmental Justice: Bridging the Gap Between Environmental Laws and "Justice,"* 47 AM. U. L. REV. 221, 256-78 (1997) (describing in detail the "tense history" between mainstream environmentalism and the civil rights/environmental justice movement). Several mainstream environmentalist organizations have tried to rectify the omission of social equity from their agenda. *See, e.g.*, *EDF Launches New Environmental Justice Initiative*, EDF LETTER, Jan. 1999, at 7.

62. *See generally* THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY (Marian R. Chertow & Daniel C. Esty eds., 1997) (exploring sustainable development concepts in a variety of applications demonstrating how sustainable development differs from traditional environmental law and policy).

63. *See* John Dernbach et al., *U.S. Adherence to Its Agenda 21 Commitments: A Five-Year Review*, 27 ENVTL. L. REP. (Envtl. L. Inst.) 10,504, 10,507 (1997) (Sustainable development "requires us to see that there is virtually no such thing as a purely economic, environmental, or

from mainstream environmentalism, market economics theory, and social equity causes such as environmental justice to assemble its multi-dimensional policy agenda. However, sustainable development can only thrive if it resists being captured and dominated by any one of those three policy legs. Therein lies the source of the co-evolutionary coupling between sustainable development and environmental justice.

1. Cooperation—The Story Until Now

Sustainable development and environmental justice emerged as well-formed policy ideas at about the same time, in the early 1980s,[64] and immediately forged a cooperative relationship. Sustainable development benefited from the intensity with which environmental justice advocates focused on the equity leg of the policy triad. Environmental justice benefited from the increasingly broad policy acceptance that sustainable development enjoyed across international and national lines which legitimized the more narrow message of environmental justice. As the two policy ideas grew in the 1980s their mutual cooperation assured that respective positions prospered in the marketplace of environmental policy approaches.

Early compilations of the environmental justice agenda thus included sweeping endorsement of policies that could be regarded as consistent with sustainable development. For example, the October 1991 First National People of Color Environmental Leadership Summit produced the "*Principles of Environmental Justice*,"[65] outlining a broad agenda of "political, economic, and cultural liberation."[66] The principles proclaimed that environmental justice "affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species,"[67] as well as the "fundamental right to political, economic, cultural and environmental self-determination of

social problem."); Susan L. Smith, *Ecologically Sustainable Development: Integrating Economics, Ecology, and Law*, 31 WILLAMETTE L. REV. 261, 263 (1995) ("Integrating economic and environmental concerns is the controlling policy objective of sustainable development.")

64. *See* Pezzoli, *supra* note 1, at 549-55 (sustainable development); FOREMAN, *supra* note 2, at 10-33 (environmental justice); Kaswan, *supra* note 61, at 225-28 (environmental justice).

65. *See* First People of Color Environmental Leadership Summit, Principles of Environmental Justice (adopted Oct. 27, 1991), *reprinted in* FOREMAN, *supra* note 2, at App. B. *See also* Cheryl A. Calloway & Karen L. Ferguson, *The "Human Environment" Requirements of the National Environmental Policy Act: Implications for Environmental Justice*, 1997 DET. C. L. REV. 1147, 1151, 1182-84 .

66. Principles of Environmental Justice, *supra* note 65 (preamble).

67. *Id.* (Principle 1).

all peoples."[68] According to the *Principles*, "environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources . . . as possible[,] and to insure . . . the health of the natural world for present and future generations."[69] Other influential environmental justice leaders offered similarly broad formative statements of the movement's agenda that encompassed sustainability, in particular a brand of sustainability focused at community levels.[70] Nothing in the early rhetoric of the environmental justice movement suggested anything but support for sustainability policy.

Nothing illustrates sustainable development's contribution to this mutually beneficial, cooperative relationship better than the 1997 report of the President's Council on Sustainable Development (PCSD).[71] The PCSD summarized its report with a 16-point "*We Believe*" statement that completely abandons the resourcism-environmentalism dichotomy.[72] Central to the statement was ringing endorsement of the fusion of economy, environment, and equity into a united policy triad. For example, the PCSD prominently declared that "[e]conomic growth, environmental protection, and social equity are linked."[73] To drive the point home, the PCSD reiterated that theme in several different points of the "*We Believe*" statement,[74] as

68. *Id.* (Principle 5).

69. *Id.* (Principle 17).

70. *See* FOREMAN, *supra* note 2, at 12-13, 152 n.17.

71. The PCSD issued its report in February 1997. *See* PRESIDENT'S COUNCIL ON SUSTAINABLE DEVELOPMENT, SUSTAINABLE AMERICA: A NEW CONSENSUS (1997) [hereinafter SUSTAINABLE AMERICA]. President Clinton commissioned the PCSD by executive order on June 29, 1993, to "develop and recommend to the president a national sustainable development action strategy that will foster economic viability." Exec. Order No. 12,852, 58 Fed. Reg. 35,841 (1993). The PCSD has issued additional reports focusing on translating its recommended policies into concrete measures, see PRESIDENT'S COUNCIL ON SUSTAINABLE DEVELOPMENT, BUILDING ON CONSENSUS: A PROGRESS REPORT ON SUSTAINABLE AMERICA (1997), and has been authorized "to continue its work by continuing to forge consensus on policy, demonstrating implementation, getting the word out about sustainable development, and evaluating progress." The Fifteenth Meeting of the President's Council on Sustainable Development in Tulsa, Oklahoma, 62 Fed. Reg. 45,283 (1997). For further background and description of the PCSD's work and its place in the emerging domestic sustainable development policy, see Lash, *supra* note 1, at 83-84 (PCSD co-chair); Dernbach et al., *supra* note 63, at 10,507-08.

72. SUSTAINABLE AMERICA, *supra* note 71, at v-vi, pt.10.

73. *Id.* at vi, pt.10.

74. *Id.* at v, pt.2 (Sustainable development will help "lead to the mutually reinforcing goals of economic growth, environmental protection, and social equity."); v, pt.3 (Steady progress in reducing social disparities "is essential to economic growth, environmental health, and social justice."); v, pt.5 (Economic growth is "essential for progress toward greater prosperity, equity, and environmental quality."); vi, pt.9 (Local communities must increase their roles "in deci-

well as in the body of the report,[75] and contended that the primary lesson learned from the last 25 years of environmental policy is that "[e]conomic, environmental, and social problems cannot be addressed in isolation."[76] The PCSD report thus demonstrates that sustainable development policy in the United States treats economy, environment, and equity as three inseparable dimensions.

2. Competition—Signs of Tension Are Emerging

Ironically, sustainable development's environment-economy-equity policy triad is also the source of competition between sustainable development and environmental justice. In the sustainable development framework, equity is co-equal with environment and economy. In the environmental justice framework, equity is placed above all else. Sustainable development is a multi-trait, long-term policy optimizer, whereas environmental justice is a single-trait, short-term policy maximizer. The resemblance between their relationship and the relationship of mainstream environmentalism and Deep Ecology suggests that a similar dance of competition and conflict will eventually unfold.

The numerous ongoing efforts to develop sets of "indicators" of sustainable development illustrate the multi-trait optimizing orientation of sustainable development. For example, the U.S. Interagency Working Group on Sustainable Development Indicators (SDI Group), a multi-agency policy development group formed at the recommendation of the PCSD,[77] recently issued what it calls an "experimental" set of indicators of sustainable development which it believes "reflects the multidisciplinary and intergenerational nature

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sions about environment, equity, natural resources, and economic progress."); and, vi, pt.16 (Citizens must be educated "to understand the interdependence of economic prosperity, environmental quality, and social equity.").

75. *See, e.g.*, *id.* at 12 (first three goals of the PCSD's work are to help secure health and the environment, economic prosperity, and equity); *id.* at 25 (the essential components of sustainable development are environmental health, economic prosperity, and social equity and well-being).

76. *Id.* at 26.

77. In response to the PCSD report, the Clinton Administration established the SDI Group, thus formalizing the work of a number of federal agencies who had been meeting informally since early 1994 to discuss various approaches for developing a set of sustainable development indicators. The SDI group reports to the Council on Environmental Quality in the Executive Office of the President and is supported through voluntary contributions of staff and resources by participating federal agencies. *See* U.S. Interagency Working Group on Sustainable Development Indicators, *Sustainable Development in the United States*, (visited Oct. 27, 1998)<http://198.183.146.250/CGIBIN/om_isapi.dll?clientID=6524461&infobase=sdir1297.nfo &softpage=Browse_ Frame_Pg42>[hereinafter U.S. Interagency].

of sustainable development."[78] The SDI Group divides the 40 indicators it developed into three categories: economic, environmental, and social.[79] *All* of the indicators in each category are macroscopic in focus: births to single mothers, population below poverty levels, income distribution, unemployment, and so on. *None* of the SDI Group's indicators directly asks the question whether environmental justice is present at acceptable levels. There is no single indicator devoted specifically to measuring environmental justice. Nowhere does the SDI Group reject environmental justice as a policy, and nothing in its set of indicators necessarily works contrary to environmental justice; rather, environmental justice simply is not present as a discrete policy goal.

By contrast, environmental justice increasingly defines itself according to a far narrower set of indicators than does sustainable development. Little is heard from environmental justice advocates today about the sweeping, all-inclusive agenda statements of the early 1990s. Rather, environmental justice studies focus repeatedly on multivariate statistical analyses of localized demographic indicators involving race, income, exposure to toxics, and receipt of environmental protection resources.[80] Most current environmental justice policy analyses identify demographic imbalances in environmental quality and protection that operate on relatively small scales of study, and as such are subject to almost endless debate over study method.[81] For example, one of the recurring debates in environmental justice dialogue is whether zip code or census tracts provide the better study unit for environmental justice measurements.[82] And the already nar-

78. *Id.* For other collections of and links to sustainable development indicators, see U.S. Environmental Protection Agency, Community Based Environmental Protection, *CBEP Home Page* (visited Feb. 17, 1999) <http://www.epa.gov/ecosystems/osecbak/>; Redefining Progress, *National Indicators Project* (visited Feb. 17, 1999) <http://www.rprogress.org/progsum/nip/nip_main.html>.

79. *See* U.S. Interagency, *supra* note 77, at Table 4.2.

80. One leading environmental justice advocate has explained that "for the vast majority of the groups in the Movement, the local fight is everything." FOREMAN, *supra* note 2, at 4 (quoting Lois Gibbs, Director, Citizens Clearinghouse for Hazardous Waste).

81. For recent examples see Nancy Brooks & Rajiv Sethi, *The Distribution of Pollution: Community Characteristics and Exposure to Air Toxics*, 32 J. ENVTL. ECON. & MGMT. 233 (1997), for a discussion of a zip code level cross-sectional correlation of air toxic emission location and race; Richard D. Gragg III et al., *The Location and Community Demographics of Targeted Environmental Hazardous Sites in Florida*, 12 J. LAND USE & ENVTL. L. 1 (1996), for a discussion of a demographic proximity study of hazardous facilities to minority and low income communities.

82. *See* Colin Crawford, *Analyzing Evidence of Environmental Justice: A Suggestion for Professor Been*, 12 J. LAND USE & ENVTL. L. 103 (1996). There remains tremendous contro-

row demographic approach increasingly has become more microscopic in focus. For example, EPA has adopted a site-specific demographic statistics approach for its use in determining whether individual state or local environmental permit decisions have disproportionate impacts on racial minority populations.[83] The focus of environmental justice thus is increasingly on site-specific analyses of a narrow set of demographic indicators, with race as the overarching theme of study and description.[84]

Thus it is apparent that none of the indicators being forged for sustainable development has anything meaningful to say about environmental justice *as environmental justice advocates define it*, and that none of the indicators being forged for environmental justice has anything meaningful to say about sustainable development *as sustainable development advocates define it.* There is no measure in the SDI Group's work that bears resemblance to the site-specific, race-based demographic indicators environmental justice advocates use, and hence we will not know if environmental justice improves as sustainable development indicators show progress in sustainable development. On the other hand, when environmental justice is not maximized demographically in a given location, environmental justice policy advocates offer no clue as to whether that condition is acceptable given non-equity considerations associated with environment and economy. We cannot tell from their indicators when, if ever, some environmental racial inequity is not unjust because sustainability of environment or economy requires or justifies it. The two policies, at one time cooperating to gain momentum and legitimacy, appear to have parted ways in terms of how they present themselves to the outside world.

3. Conflict—The Writing Is On the Wall

Notwithstanding their divergence on the issue of indicators for environmental policy, sustainable development advocates and environmental justice advocates rarely have criticized each other. The competition between the two policy approaches thus far has been largely passive. But skirmishes between the two recently have sur-

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versy over the merits of the demographic methods of many environmental justice studies. *See* FOREMAN, *supra* note 2, at 21-27.

83. *See SAB Recommends Steps for EPA to Follow in Analyses of "Disproportionate Impacts"*, 209 Daily Env't Rep. (BNA) A-3 (1998); *SAB to Begin Reviewing Methods for Determining 'Disproportionate Impact'*, 171 Daily Env't Rep. (BNA) AA-1 (1998).

84. *See* FOREMAN, *supra* note 2, at 121("many movement partisans unhesitatingly assign race a dominant causal role leading to unfair outcomes.")

faced in unexpected contexts, suggesting that more and larger battles may be in their future.

For example, when EPA recently proposed a set of guidelines for investigating claims that state and local environmental permitting decisions violate Title VI of the Civil Rights Laws,[85] its biggest critics were not from industry, but rather from state and local environmental agencies complaining of the narrow focus and burdensome requirements of what amounts to a core environmental justice goal.[86] EPA's guidelines, and their application in one alleged case of disproportionate impact regarding a proposed facility in Michigan, led to the first case of outright war between EPA's environmental justice agenda and a state environmental agency. Environmental justice advocates used EPA's Title VI rules to challenge the state's issuance of an air pollution permit to a proposed steel mill, a permit that the state contended complied with all EPA air pollution rules and appropriately balanced environment, economy, and equity.[87] After a high-profile proceeding in which the state essentially put EPA's environmental justice program on trial, the state won.[88] EPA is now in the

85. *See* U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, *Interim Guidance for Investigating Title VI Administrative Complaints Challenging Permits* (visited Oct. 26, 1998) <http://es.epa.gov/oeca/oej/titlevi.html>(explaining how EPA will investigate claims that issuance by states of environmental pollution permits violates environmental justice goals).

86. *See* John Pendergrass, *EPA Discrimination Guidance Dispute*, ENVTL. F., Sept.-Oct., 1998, at 6; *States Negative on Interim Guidance*, 29 Env't Rep. (BNA) 232, 232 (1998); *Comments on Title VI Guidance Seek Clearer Definitions, Input from More Parties*, 29 Env't Rep. (BNA) 234, 235 (1998). To be sure, there is no shortage of concern being expressed from industry either. *See, e.g.*, David Warner & James Worsham, *The EPA's New Reach*, NATION'S BUSINESS, Oct. 1998, at 12.

87. The matter involved a complaint filed with EPA alleging that the Michigan Department of Environmental Quality violated Title VI in issuing a Clean Air Act permit to Select Steel Corporation of America for construction of a $175 million steel recycling mill in Flint, Michigan. *See Michigan Governor Blames EPA Policy for Company Decision to Scrap Factory Plan*, 172 Daily Env't Rep. (BNA) AA-1 (1998); *Michigan DEQ Chief Says EPA Narrowing Issues Considered in Title VI Complaints*, 225 Daily Env't Rep. (BNA) A-1 (1998).

88. On October 30, 1998, the EPA Office of Civil Rights issued a letter of decision dismissing the complaint, primarily because the evidence demonstrated that the facility would not cause violations of health-based ambient air quality standards and technology-based emission limits enforced under the Clean Air Act. *See* EPA File No. 5R-98-R5 (visited Feb. 23, 1999) <http://www.epa.gov/region5/steelcvr.htm>. *See also EPA Panel Upholds Flint Steel Mill Permit; Michigan Seeks Dismissal of Complaint*, 29 Env't Rep. (BNA) 1119, 1119 (1998); *EPA Dismisses Complaint on Proposed Steel Plant in Michigan*, 29 Env't Rep. (BNA) 1351, 1351 (1998); *EPA Dismisses Michigan Complaint; State Officials Still Wary of New Policy*, 211 Daily Env't Rep. (BNA) AA-1 (1998). A collection of environmental and public interest groups petitioned EPA to reopen the complaint, alleging that it was politically motivated and presents a dangerous precedent for EPA's Title VI policy. *See* Paul Connolly, *Groups Say EPA Must Reconsider Dismissal of Michigan Civil Rights Act Complaint*, Daily Env't Rep. (BNA), Mar. 2,

process of revising the proposed Title VI guidelines, presumably to address the criticisms lodged by state and local officials among others.[89]

The Michigan steel mill case is unlikely to remain the sole example for long.[90] The potential for conflict between sustainable development and environmental justice increases as the latter demands site-specific outcomes that do not comport with the local, regional, and national goals of sustainable development. As environmental justice becomes more intransigent in its strategy, as is likely in the face of a strengthening sustainable development movement, it will lead to increasing numbers of clashes between the two.[91] Gradually, what were once mutually compatible policy approaches will grow distant, and it is unlikely that sustainable development advocates have an unlimited supply of cooperation strategies available for dealing with environmental justice's intractable demands. Conflict is inevitable. Although environmental justice may win some battles along the way, if it wages all out war against sustainable development, it is unlikely to win in the long run.[92]

CONCLUSION

Sustainable development and environmental justice are locked in a co-evolutionary relationship, coupled by their mutual focus on

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1999, at A-5. As of this writing EPA had not ruled on the petition.

89. *See Environmental Justice: Draft Revision of Guidance for Processing Rights Complaints Expected by Mid-1999*, 29 Env't Rep. (BNA) 1807 (1999). An advisory panel EPA created to assist in the revisions was unable to reach consensus recommendations and instead will be delivering to EPA a report detailing the members' divergent views about the issue. *See* Cheryl Hogue, *Title VI Advisory Panel Report Sets Out Issues, Gives No Recommendation*, Daily Env't Rep. (BNA), Mar. 2, 1999, at A-7.

90. A similar claim recently was filed against the Texas Natural Resources Conservation Commission, alleging the agency has engaged in Clean Air Act permit and enforcement decisions having racially unjust impacts. *See Two Environmental Groups File Civil Rights Complaint Against TNRCC Over Air Permits*, 243 Daily Env't Rep. (BNA) A-7 (1998).

91. Foreman predicts that "[i]f pursued aggressively, environmental justice may exacerbate aspects of environmental policymaking that have been widely bemoaned (such as economic inefficiency, muddled policy priorities, the gap between expert and public perceptions of risk, and local inflexibility on siting issues)." FOREMAN, *supra* note 2, at 3. It is precisely those aspects of mainstream environmentalism that sustainable development advocates hope to rid from environmental policymaking; hence, to the extent environmental justice stands in their way, the two may come to blows.

92. This is particularly likely as environmental policy attention focuses increasingly on regional and global issues such as acid rain, global warming, and fisheries depletion. Environmental justice as a "movement is too weak, has too few resources, and has too strong a local orientation to be a significant separate presence on such national and international matters." *Id.* at 122.

social equity. However, they are not entirely compatible in that focus. Sustainable development includes equity as a co-equal partner in the policy triad of environment, economy, and equity, concerning itself with optimizing the balance of those three goals over time across large and small geographic scales. Environmental justice uses equity as the theme for a narrow, single-minded focus on eliminating disproportionate impacts of environmental degradation on racial minorities at site-specific levels. While there is room for cooperation between those two systems of environmental policy, there is also the likelihood of competition and conflict.

If the history of mainstream environmentalism and Deep Ecology is any indication, and it may not be, over time sustainable development and environmental justice will find less in common. But they will always be coupled in a co-evolutionary dance. The bottom line for sustainable development is that, while it will become the dominant force in national and international environmental policy, it will always have to deal with the narrow, locally-entrenched form of environmental justice. The bottom line for environmental justice is that so long as it contends that racially disproportionate local impact is *never* acceptable regardless of economic and environmental sustainability indicators, it will play an opposition role in the environmental policy of the future. If environmental justice advocates want more than that, they are likely to be as disappointed and marginalized as today's Deep Ecology devotees; however, if they are content with having a seat at the table of sustainable development, though with no power of veto, they will continue to have a meaningful role in the co-evolutionary play of environmental policy.

This prediction of the co-evolution of sustainable development and environmental justice is not meant to discourage or discredit the environmental justice policy movement. Environmental justice undoubtedly will shape sustainable development. It already has. But the writing is on the wall: as a complex adaptive system driven by the goal of multi-trait optimization, sustainable development will relate to environmental justice through strategies of cooperation, competition, and conflict. The unknown for now is what the mix of those strategies will be.