Green Governance: Building the Competencies Necessary for Effective Environmental Management

by LeRoy C. Paddock

Editors' Summary: In this Article, LeRoy C. Paddock examines the issue of green governance by looking at several of the changes that are driving the need for new approaches, the long series of studies calling for reform in environmental governance, and four case examples involving impaired waters, urban ozone and particulate pollution, brownfields rehabilitation, and nanotechnology. He concludes with suggestions about how to more effectively integrate economics-based and values-based tools into the way government approaches environmental problem solving.

I. Introduction

Almost 40 years after the dawn of the modern age of federal environmental law, the nature of the environmental challenges faced by the United States have so fundamentally changed that the country's system of environmental governance must be completely re-imagined to ensure healthy air, clean water, a stable climate, safe drinking water, vital ecosystems, and continuing biodiversity. For most of this time environmental governance has primarily been, and been seen as, a regulatory process within the domain of government. Today, environmental governance must become a shared enterprise, anchored by government regulatory programs, but fully integrating economics-based and values-based behavioral drivers as well. Rather than relying primarily or direct regulations to control behavior, government (and other organizations) must employ a variety of direct and indirect measures in a new system of environmental governance to achieve desired environmental outcomes. These measures may include collaboration, voluntary programs, information, participation, taxes and fees, business drivers such as reputation and investor relations, education, and consumer pressure, among others. This will require government to rethink how its human and financial resources are deployed to leverage the maximum possible environmental results from those approaches.

A. Changing World in Which Change Is Accelerating

The changes necessitating this shift from environmental programs heavily focused on traditional regulation to a leveraged management system that relies on a variety of actors to help shape environmental outcomes have come in many forms:

- The complex, societywide issues associated with greenhouse gas (GHG) emissions were not on the scientific radar screen in the early 1970s.
- The value of wetlands and the effect of persistent bioaccumulative toxins on fisheries were not well understood outside of the scientific community.
- Urban sprawl and intense development along many coastal areas were not as severe as they are today.
- The impact of nonpoint sources of water and air pollution, though anticipated, were not the focus of the regulatory system and not thought to be as significant as they have proved to be.
- The impacts on air quality and climate from motor vehicles, ships, and aircraft have dramatically changed as the economy has globalized, ships and trucks have become the virtual warehouse for just-in-time manufacturing and big-box retailing, and the number of vehicle miles traveled has skyrocketed.
- The rapid growth in abandoned urban industrial property resulting from major changes in the manufacturing patterns and, at least in part, from the unintended consequence of the liability system designed to drive cleanup of old industrial waste sites.
- The increasing pace of scientific breakthroughs like nanotechnologies are beginning to outpace the ability of the regulatory system to respond using traditional approaches.
- The dramatic shift in the United States from a manufacturing economy to a service econ-

mony—where service businesses now account for three-fourths of the nation’s economy and 80% of its employment—has eliminated many major industrial point sources, but now includes a vastly larger number of smaller sources of pollution.

- The scale of environmental problems such as climate change, mercury contamination, biodiversity loss, and illegal logging and the cost of responding to the problems has dramatically increased.
- Globalization of the economy means that consumer decisions have environmental impacts both locally and in countries throughout the world.
- The public desires to be more fully engaged in decisions about environmental issues in their community and more generally.

As Marian Chertow and Daniel Esty observed in their book Thinking Ecologically:

In the past, when environmental insults were obvious and the targets of controls were big smokestack industries, making companies pay for their despoliation had a moral logic that offered wide appeal. Today, however, when many of the harms we face reflect the cumulative impact of millions of individual and small enterprises, the enemy is “us” and the moral certainty of the crusade is harder to sustain.

Point source pollution control over the last 35 years has produced tremendous public health and economic benefits. But it has also been a very expensive enterprise, with the nation spending in excess of $20 billion annually to carry out our environmental laws. Most of these costs have been absorbed by the same point source facilities that have been the focus of environmental regulation. These costs have become embedded in the price of goods and services and are, for the most part, not particularly visible to the public.

However, the cost of dealing with many of the new sources of environmental problems like GHGs, nonpoint source water pollution, and urban sprawl may be far more apparent to the public since many of the costs will not be as easily blended into the economy, at least in the short term. The cost of rehabilitating major ecosystems is staggering, requiring sources of revenue that stretch far beyond the scope of traditional environmental funding. For example, the cost of achieving the water quality goals for a healthy Chesapeake Bay are estimated to be in excess of $25 billion, the cost of the Comprehensive South Florida Ecosystem Restoration Plan is expected to exceed $19 billion, and a 2006 version of the Great Lakes Regional Collaboration Implementation Act called for more than $20 billion in spending over a five-year period. The costs of a serious effort to stabilize carbon dioxide (CO2) emissions are even higher, with one recent estimate by Prof. Robert Stavins indicating that the cost will be between 0.5% and 1% of gross domestic product (GDP) annually depending on the chosen reduction targets. Given a GDP of about $13 trillion, this is an annual cost of between $65 billion and $130 billion. The scale of these costs is driving policymakers to find new ways of approaching environmental problems.

B. The Consequences of Change

The nature of today’s environmental problems and the costs to remedy those problems has dramatic consequences for the design of an effective system of environmental governance. The public can no longer simply turn over environmental problems to “expert” government agencies and expect the problems will be resolved without their involvement or commitment. And the public cannot expect these major environmental problems to be solved without committing either significant new tax or fee revenues or new sources of nongovernmental funding to the problems. Legislatures and government agencies can no longer concentrate most of their efforts on large public and industrial facilities and expect that major ecosystem problems will be adequately addressed. Simply writing rules, requiring permits, enforcing the permits, and reporting to the public about how many permits have been issued and how many penalties have been imposed is increasingly an insufficient response. The public wants to know how much cleaner its air and water is as a result of what government is doing.

Industrial facilities and service operations cannot simply outsource or offshore their environmentally damaging operations and expect that they have satisfied their environmental obligations, nor can they expect that mere compliance with a limited set of environmental standards will be sufficient to satisfy their customers’ expectations or the demands of their investors and insurers. Farmers and developers who have for the most part escaped the reach of the environmental regulatory system cannot expect this situation to continue as the consequences of land use on the environment become more evident.

Both government and facility owners must recognize that members of the public want more information about environmental conditions, want more and earlier opportunities to participate in environmental decisions, and want to have a real voice in the decisionmaking process.

This new system of environmental governance will be complex and difficult to manage; government “controls” much of the regulatory system but often only has the ability to influence economics-based and values-based environmental behavioral drivers that many of the new approaches rely upon. Thus, any new system of environmental governance will require new societal arrangements. In some


4. Fiorino, supra note 1, at 1.


cases, government will still set the standards and the rules of behavior. In other cases, new forms of stakeholder consultation will be needed where government, citizens, businesses, and nongovernmental organizations (NGOs) work with each other to achieve agreed-upon environmental goals. In still other cases, companies will establish their own environmental standards driven by economic factors including cost savings and the opportunity to differentiate their products, but also by reputation, customer demand, insurance availability, investor decisions, and other factors like corporate values. Governments’ role in this area may simply be to recognize these economic forces driving corporate behavior and to not intervene in a way that would limit these forces. Or, government may be in a position to encourage corporate “behind compliance” behavior through a variety of incentives or by providing information to the public.

In some cases, communities will drive environmental behavior through forces such as common law, legislative liability standards, local environmental regulation, customer demands, investment decisions, company reputation, and educational campaigns. Governments’ role in these circumstances may be to provide information supporting community-based activities or to provide wider community access to government processes.

In yet other cases, NGOs will drive company behavior through negotiations, threats of public action, or shareholder actions. Government may be able to facilitate NGO action through participation in collaborative efforts and by providing information, including scientific data.

II. Calls for New Approaches to Environmental Governance

For nearly 20 years, a wide range of organizations, including the U.S. Environmental Protection Agency (EPA) and state environmental agencies, has recognized that the traditional regulatory approach cannot, by itself, achieve the kind of environmental outcomes needed to solve many of the nation’s most critical environmental problems. As early as 1987, EPA began to reexamine the most important environmental risks facing the country and found that many of those risks (including the relatively highly ranked risks related to habitat destruction, loss of biodiversity, climate change, and nonpoint source discharges to surface water) were outside of the Agency’s core regulatory programs. The following discussion looks at several of the critiques of the core regulatory system in chronological order.

A. National Academy of Public Administration: Setting Priorities, Getting Results

In 1995, the National Academy of Public Administration (NAPA), in what would become a long series of reports on EPA, produced a list of the most serious “residual” environmental risks. The list was similar to that produced by EPA in 1987, and included polluted runoff from farms and urban development, high levels of ground-level ozone, climate change, biodiversity loss, and degradation of coastal zones. NAPA noted: “One thing which the problems in the list have in common is that they are caused not only by the emissions of chemicals from smokestacks and drainage pipes, but from thousands or even millions of different sources, or from patterns of land use.” and pointed out that “EPA’s traditional command-and-control approaches are relatively ineffective tools for managing most of the problems on the list...” To better cope with the nation’s environmental problems, NAPA suggested a shift “from a system that relies heavily...on tightly defined pollution controls set by federal lawmakers and regulators, to a system that would rely more heavily...on the ability of individuals, firms, communities, and states to meet national environmental standards in ways that make the most sense to them.”

Although the need to rely more heavily on actors outside government to produce desired environmental outcomes was noted by NAPA more than 13 years ago, this shift in focus has proven difficult to accomplish. Coincident with the NAPA work, the Aspen Institute through its “Series on the Environment in the 21st Century” and President William J. Clinton’s Council on Sustainable Development took in-depth looks at the U.S. environmental regulatory system.

B. The Aspen Institute

The Aspen Institute’s Series on the Environment in the 21st Century was one of the first efforts to seriously engage government, business, and environmental organizations in a balanced stakeholder dialogue focused on developing a new environmental management system for the United States based on “the belief on all sides that current environmental protection and enhancement strategies are not sufficient to meet the environmental challenges of the next century.” This belief led to a goal of developing “a new way to protect and enhance the environment consistent with a sustainable society characterized by a vibrant economy, protection of public health and the natural environment, and social and environmental justice.” The Aspen participants called this new way “The Alternative Path.” They explain that

[a company or other regulated entity choosing to operate under the Alternative Path may design a tailored, more efficient environmental management plan with increased flexibility as to how the environmental goals are achieved. This may involve waivers of currently applicable regulatory requirements. In return, however, the plan must be developed in an open, transparent, consensus-based regulatory process; it must ensure the attainment of better environmental performance than would be achieved under the traditional regulatory process; and it must not result in significant increase in risk to any exposed population or shift risks from one population to another.

12. Id. at 24.
13. Id. at 25.
14. Id. at 172.
16. Id. at 2.
17. Id. at 3-4.
The Alternative Path provided a quid pro quo for regulated entities: increased flexibility to identify and utilize the most efficient means of accomplishing environmental results in return for a commitment to achieving environmental outcomes beyond the minimums established by law, increased transparency, stakeholder involvement, and a greater focus on prevention and continuous improvement. As the Aspen Institute Report noted:

The Alternative Path is founded on a new, more cooperative relationship [among] regulators, the regulated companies and communities, and affected constituencies—stakeholders who are impacted by the decisions and outcomes. At the heart of this relationship is a mutually beneficial approach—allowing more flexible and efficient compliance methods in return for achieving superior environmental performance and involving stakeholders more directly in the information sharing and decision-making process.

The Clinton Administration’s Regulatory Reinvention effort adopted the Aspen concept in 1995 launching Project XL (Excellence and Leadership), a high-profile experimental effort to test the Alternative Path.

The Aspen Institute’s proposal involved a rather limited innovation; providing more flexibility in the permitting process or avoiding the need for some new permits by allowing companies to operate under facility-wide caps or through the use of other mechanisms in return for superior performance commitments and greater involvement of stakeholders. However, even this limited innovation faced significant obstacles when it was introduced in the XL program and has not survived in any major EPA programs today. It also focused on reforms in the regulatory system rather than going beyond the regulatory system to introduce new economic or values-based approaches. The President’s Council on Sustainable Development (PCSD) took a broader approach to reform.

C. PCSD

The PCSD, an elaborate multi-year, multi-stakeholder effort, examined in depth the need to diversify the methods used to drive desired environmental results. The council found that

Future progress requires that the United States broaden its commitment to environmental protection to embrace the essential components of sustainable development: environmental health, economic prosperity, and social equity and well-being. This means reforming the current system of environmental management and building a new and efficient framework based on performance, flexibility linked to accountability, extended product responsibility, tax and subsidy reform, and market incentives.

Specifically, the PCSD recommended an “alternative path” similar to the Aspen Institute proposal, but went well beyond Aspen in recommending new approaches to environmental management. PCSD’s recommendations included the following:

- A “voluntary system that ensures responsibility throughout a product's life cycle by all of those involved in the life cycle. The greatest opportunity for extended product responsibility rests with those throughout the commerce chain—designers, suppliers, manufacturers, distributors, users, and disposers—that are in a position to practice resource conservation and pollution prevention at lower cost”;
- Tax policies, e.g., carbon taxes, that discourage environmentally damaging production and consumption decisions and eliminate subsidies that encourage activities inconsistent with economic, environmental, and social goals;
- Greater use of market incentives such as cap-and-trade systems, congestion pricing, and energy efficiency surcharges on utility bills;
- “[O]pen information policies and practices, recognizing that disclosure and active dissemination of information should be the rule, not the exception”;
- A system of indicators that report progress toward national sustainable development goals to the public on a regular basis;
- Changes in the formal education system to help students, educators, and education administrators learn about the environment, the economy, and social equity;
- “[N]onformal access to information on, and opportunities to learn and make informal decisions about, sustainability as it relates to citizens’ personal, work, and community lives”;
- “[V]oluntary, multistakeholder, collaborative approaches to protect, restore, and monitor natural resources and to resolve natural resources conflicts”;
- Incentives such as tax credits, conservation reserve payments and resource depletion fees “to

23. The PCSD recommended the creation of “a bold, alternative environmental management system designed to achieve superior environmental performance and economic development that relies on verifiable and enforceable performance-based standards and provides increased operational flexibility through a collaborative decision-making process.” Id. at 34.

24. Id. at 40. This recommendation moves beyond traditional regulatory approaches to incorporate programs such as EPA’s Green Chemistry® and Energy Star® programs but does not recommend a move as far as some of the product regulation approaches adopted by states, e.g., Minnesota’s electronics and metals regulations, or in European Union Directives.

25. Id. at 46.
26. Id. at 50.
27. Id. at 64.
28. Id. at 66.
29. Id. at 74.
30. Id. at 78.
31. Id. at 115.

18. Id. at 4-6.
19. Id. at 9.
20. Id. at 11.
stimulate and support the appropriate involvement of corporations, property owners, resource users, and government at all levels in the individual and collective pursuit of stewardship of natural resources.\textsuperscript{32}

The PCSD report is the first major set of environmental policy recommendations to fully embrace a triangulated approach to environmental management that relies on an enhanced regulatory system, economic incentives and disincentives, and individual and organizational values based on better environmental education and improved access to information to achieve the goal of sustainable development. Almost all of the elements of advanced environmental governance needed to address the problems discussed in the case examples later in this Article are included in the PCSD recommendations.

EPA incorporated some of these ideas into its programs through, for example, Project XL, the Common Sense Initiative,\textsuperscript{33} its public involvement policy,\textsuperscript{34} the creation of its Office of Information,\textsuperscript{35} the Agency’s five-year strategic planning and goal-setting process,\textsuperscript{36} and its Smart Growth Initiative.\textsuperscript{37} However, the Agency has not adopted the kind of systematic governance changes envisioned by the PCSD.

\textbf{D. NAPA: Resolving the Paradox of Environmental Protection and “Enterprise for the Environment”}

NAPA revisited the issue of environmental governance in 1997. It found that EPA’s main challenge is to learn to maintain and improve a regulatory system that is both nationally consistent and individually responsive to the particular needs of each state, community, and company. That paradox can be resolved only if the agency and Congress continue to adopt performance-based tools. These include information management systems, market-based controls, compliance-assurance strategies, regulations which encourage firms to choose among compliance strategies, and new partnerships with states and businesses.\textsuperscript{38}

Former EPA Administrator William Ruckelshaus served on the 1997 NAPA panel and at about the same time launched an effort of his own to identify ways that the environmental governance system needed to evolve to deal with the most pressing environmental problems. Enterprise for the Environment (E4E), yet another broadly representative stakeholder-based project, concluded:

\textbf{[The current environmental protection system must be improved if it is to deal effectively with the serious environmental problems and challenges faced by the United States. Participants also agree that steps must be taken to both improve the quality of the environment and increase the effectiveness, efficiency, and fairness of the nation’s environmental protection system. They believe that in the future, the system should encourage businesses, nonprofit organizations, government agencies, and individual citizens to reach higher levels of responsibility, accountability, commitment, and stewardship. In other words, because of both the nature of the environmental challenges that lie ahead and the inefficiencies associated with the current environmental protection system, E4E participants believe the system must evolve for progress to be possible.\textsuperscript{39}]

Key E4E recommendations included the following:

- Setting and pursuing clear environmental goals and milestones;
- Offering flexibility of means to meet environmental goals coupled with clarity or responsibility, accountability for performance, and transparency of results;
- Relying on a broader set of policy tools including economic incentives that reward superior performance and stimulate technology innovation, incentives that change individual behavior, and disclosure of consistent and accurate source-level information;
- Promoting collaborative problem solving;
- Encouraging high levels of stewardship; and
- Creating decision processes that meaningfully involve affected stakeholders.\textsuperscript{40}

\textbf{E. NAPA: Environment.gov}

Perhaps the most in-depth examination of environmental governance over the past decade is NAPA’s report entitled Environment.gov,\textsuperscript{41} involving 16 research teams who examined a wide range of issues from state and federal innovations programs to emissions trading to watershed planning to the working relationship between EPA and the states. The NAPA panel’s blunt conclusion was that

\textbf{[The nation’s current environmental protection system cannot deliver the healthy and sustainable world that Americans want. Absent significant change in America’s environmental governance, the accumulation of greenhouse gases will continue to threaten the stability of the global climate and all of the systems that depend upon it; the uncontrolled runoff of fertilizer and other pollutants will continue to choke rivers, lakes, and estuaries with oxygen-depleting algae; smog will continue to degrade the health of millions of Americans. The regulatory programs in place in this country simply cannot address those problems at a price America can afford.\textsuperscript{42}]

Instead, NAPA recommended that clear, measurable goals be established for making progress on the big environmental-

\textsuperscript{32} Id. at 124.
\textsuperscript{35} See U.S. EPA, Office of Environmental Information (OEI), http://www.epa.gov/oei/.
\textsuperscript{38} NAPA, RESOLVING THE PARADOX OF ENVIRONMENTAL PROTECTION: AN AGENDA FOR CONGRESS, EPA, AND THE STATES 2 (1997).
\textsuperscript{39} NAPA, THE ENVIRONMENTAL PROTECTION SYSTEM IN TRANSITION: TOWARD A MORE DESIRABLE FUTURE 3 (Center for Strategic & Int’l Studies 1998).
\textsuperscript{40} Id. at 4. Many of these recommendations also received support in a 1997 report issued by the National Environmental Policy Institute. See Nat’l Envtl. Policy Inst., Environmenal Goals and Priorities: Four Building Blocks for Change (1997).
\textsuperscript{41} NAPA, ENVIRONMENT.GOV: TRANSFORMING ENVIRONMENTAL PROTECTION FOR THE 21st CENTURY (2000).
\textsuperscript{42} Id. at 11.
tal problems of nutrient loading, smog, and GHGs. NAPA further recommended that these issues be given priority attention, and a much broader range of innovative tools (including market-based mechanisms, collaboration, third-party auditing, industry leadership programs, and industry self-regulation) to attack these problems. Finally, NAPA recommended that much more information, including information on progress in meeting environmental goals, be gathered and made available to the public. In essence, in environment.gov, NAPA seconded the recommendations of the PCSD.

F. Think-Tank Perspectives

Think-tanks from a range of perspectives have also pointed out the need for a change in the regulatory system. The free market-oriented Reason Foundation observed that

"[i]n the 1960s and 1970s, implicitly, and sometimes explicitly, viewed the information challenge as one of identifying general environmental problems and then specifying uniform remedies to those problems; information relevant to environmental problem solving was perceived to be the sort that could be collected and centralized within as agency of experts, then translated into a series of one-size-fits-all regulations that prescribed acceptable technologies, cleanup methods, and single-purpose wilderness management plans. The public sector was the sector of choice for solving environmental problems, and punishment rather than cooperation was the method of choice for securing compliance on the part of the private sector."44

Their new vision of environmental regulation includes the following five attributes:

- Stresses problem solving instead of primarily relying on punishment;
- Strives to balance competing values, both environmental values against other values, and some environmental values against other environmental values;
- Seeks flexibility in methods of compliance, so that companies can choose the lowest cost way of following the law instead of having to follow a single prescribed way;
- Views the private sector as a key partner in environmental improvement; and
- Tries to bring decisionmaking authority to the lowest possible level where it makes sense—so that local problems can have local solutions, state problems can have statewide solutions, and federal problems can have federal solutions.45

In a similar vein, the Progressive Policy Institute (PPI), an organization associated with the Democratic party centrists, noted in 1999: "Environmental policy must be modernized to keep pace with the dramatic transformation in the environment, economy, and population. The first generation of rules simply cannot get the job done."46

PPI recommended that second-generation strategies rely on better information that will drive performance and accountability, increased civic engagement to help solve place-based environmental problems, and expanded use of market-based incentives and regulatory flexibility to improve environmental performance and spur innovation.47

G. NAPA: Taking Environmental Protection to the Next Level

Major regulatory reform studies were noticeably absent in the early part of this decade. However, NAPA reentered the arena in 2007 with its report Taking Environmental Protection to the Next Level: An Assessment of the U.S. Environmental Services Delivery System.48 The study, requested by the Office of Management and Budget, was designed to provide "an independent assessment of the U.S. environmental services delivery system and ways to optimize the capabilities of each level of government to achieve the greatest environmental and public health results."49

NAPA found numerous reasons for a new approach to the delivery of environmental services such as the increased need to focus on diffuse sources of pollution, the limits to EPA's authority in areas such as nonpoint source pollution and brownfields rehabilitation, the increased public demand for information, the need to engage local governments and private organizations in resolving major ecosystem-based environmental problems, and the high cost of large-scale rehabilitation efforts.50

What is clear from the changes in the nature of environmental problems in each media is that the specific job each program is mandated to do by statute—its outputs [rules, permits, inspections, enforcement actions]—may not be enough to achieve the desired environmental outcome—clean air, clean water, or clean land. But ultimately, the environmental outcome is what voters, taxpayers, and the affected public care about. Most people

43. Id. at 190-93.
44. Alexander Volokh et al., Introduction to Race to the Top: The Innovative Face of State Environmental Management (The Reason Foundation Policy Study No. 239, 1998).
45. Id.
46. DEBRA KNOPMAN & EMILY FLESCHEMER, PROGRESSIVE POL'Y INST., BRIEFING, SECOND GENERATION OF ENVIRONMENTAL STEWARDSHIP: IMPROVE ENVIRONMENTAL RESULTS AND BROADEN CIVIC ENGAGEMENT (1999). The study noted:

- Two-fifths of smog-causing nitrogen oxides come from factories and power plants. The rest comes from cars, trucks, railroads, airplanes, and other miscellaneous non-industrial sources whose actual emissions are difficult to control under the Clean Air Act rules.
- Agricultural runoff—not included in the Clean Water Act permitting program—is now the most extensive source of water pollution, affecting 70 percent of rivers and streams failing to meet water quality standards.
- More than two-thirds of greenhouse gas emissions—totally unregulated under the Clean Air Act—come from electricity consumed to heat, cool, and light homes and buildings, and from fossil fuels for transportation; industry energy use accounts for the remaining third.
- More than two-thirds of threatened and endangered species reside on private lands where the Endangered Species Act is least effective.
47. Id.
49. Id. at 1.
50. Id. at 5-6.
do not understand or care about the details of program administration, but they do care a great deal about what difference the programs make to them individually, to the economy, and to the natural environment. The program outputs—and the effectiveness and efficiency with which they are produced—remain very important of course, and should continue to be measured and used to improve program management, but they are no longer enough to demonstrate the kind of “results” for which the agencies are now responsible.

... Producing a clean environment, rather than issuing permits for individual facilities and checking compliance with them, requires managers to involve many more partners, use new forms of collaborative management, obtain and work with greatly improved and more timely data, measure environmental outcomes rather than just program outputs, devise accountability systems that include far more parties than just EPA and the states, and accomplish many other unfamiliar tasks. 51

To significantly improve the manner in which EPA delivers environmental services, NAPA recommended that the Agency:

- Strengthen its position as a partnering agency while maintaining a strong regulatory presence;
- Create a nonpoint source water pollution program on a par with its point source program;
- Directly serve as the coordinator for or support regional coordination efforts in resolving ecosystem-scale problems;
- Provide the scientific support needed to effectively address ecosystem-scale problems;
- Find, or help other units of government find, new sources of funding that can support large ecosystem restoration projects;
- Support innovative approaches to environmental problem solving; and
- Continue to improve outcome-oriented, performance management systems. 52

H. Study Conclusions

The similarity of the conclusions from these studies and policy recommendations is striking. They recognize the need for a strong regulatory and enforcement system to anchor a diverse range of new approaches and tools that will help drive environmental improvement. The studies emphasize the importance of

- Establishing priorities, setting goals, and measuring progress;
- Improving access to information including good scientific data;
- Public engagement;
- Partnering and other forms of collaboration;
- Bringing new financial resources to the table;
- Innovation in developing and deploying a broad range of approaches to solving environmental problems; and
- Individual and corporate responsibility and extended producer responsibility.

Equally striking, though, is the fact that the basic system of environmental management and the allocation of human and financial resources are little changed at their core after nearly 20 years of introspection. Daniel Fiorino observed in his book, The New Environmental Regulation:

Despite the several efforts to innovate, regulation in 2001 was not much different from what it had been in 1991. Behavior and relationships had changed somewhat; law and policy had changed very little. So William Ruckelshaus could write in 1998 that EPA had made progress but “only at the margins of the agency’s programs.” This statement was only slightly less valid by 2005. 53

Experiments have occurred for the most part on the margins of environmental governance. This is evidenced by many factors. Alternative path programs have not achieved long-term support at the federal level and remain relatively small programs at the state level. Collaborative decision-making and partnerships are increasingly used by EPA and a number of states but collaboration and partnering are still not embedded as a core element of environmental management. Some advances have occurred in public involvement especially with EPA’s public engagement policy, but many government administrators still are reluctant to fully engage the public. Innovation programs at both the federal and state level tend to be isolated from media programs, often making mainstreaming of innovation difficult, and little attention has been paid to how to engage NGOs and the public in the innovation process. More information is available but information is still not routinely seen as a central management strategy. Government-sponsored public education efforts, where they exist, remain a small part of most programs, limiting the impact that the agencies could have on individual behavior and on the behavior of smaller businesses. And, except for voluntary programs like Energy Star® or Green Chemistry® and a limited number of state product laws such as the Minnesota electronic waste legislation, 54 thinking about corporate responsibility and extended producer responsibility remains a minor element of the environmental governance equation.

III. Case Examples

Environmental problem solving has become increasingly complex over the past decade or more. As the following case examples demonstrate, government agencies, NGOs, and businesses have begun developing new ways of achieving environmental progress. These new approaches point the way for building a system of governance that can leverage significantly more resources to achieve environmental results.

A. Impaired Waters

1. Chesapeake Bay

Even though significant progress has been made over the last 30-plus years in limiting water pollution from industrial

51. Id. at 8.
52. Id. at 159-84.
53. FIORINO, supra note 1, at 153.
sources and publicly owned treatment works, approximately 40% of lakes and rivers in the United States that have been assessed remain polluted. These waters do not meet water quality standards largely because of nonpoint sources of pollution such as agricultural and urban runoff and airborne deposition.\textsuperscript{55} Solving the “impaired waters” problem in the United States is a complex challenge that requires a very different approach to governance. Consider the case of the Chesapeake Bay.

With a drainage area of 64,000 square miles in six states, the bay is North America’s largest estuary, and home to 3,600 species of fish, plants, and animals and 16 million people.\textsuperscript{56} Water quality in the bay is seriously degraded by sediment, phosphorus, and nitrogen resulting in unwanted algae blooms, dead zones where levels of dissolved oxygen cannot support fish, and loss of critical habitat for crabs and other species.\textsuperscript{57} Achieving nutrient loading levels sufficient to produce a healthy bay is a tremendous challenge, with as much as a 70% reduction in nutrients needed. As the Figures below derived from NAPA’s study of the Chesapeake Bay indicate, agriculture is the largest source of all three pollutants, contributing as much as two-thirds of the sediment pollution. Conventional point sources are the second largest source of phosphorus and nitrogen impairment, followed closely by urban and development sources. Finally, vehicles and power plants are a major source of nitrogen pollution through atmospheric deposition.\textsuperscript{58}

Chesapeake Bay Pollution Sources\textsuperscript{59}

\textbf{Sediment Sources to the Bay (2002)}

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\includegraphics[width=0.5\textwidth]{sediment_sources.png}
\caption{Sediment Sources to the Bay (2002)}
\end{figure}

\textbf{Nitrogen Sources to the Bay (2006)}

\begin{figure}
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\includegraphics[width=0.5\textwidth]{nitrogen_sources.png}
\caption{Nitrogen Sources to the Bay (2006)}
\end{figure}


\textsuperscript{56} NAPA, \textit{supra} note 48, at 47.

\textsuperscript{57} \textit{Chesapeake Bay Found.}, 2007 \textit{State of the Bay} 4-5, 8 (2007).

\textsuperscript{58} NAPA, \textit{supra} note 48, at 48-49.

\textsuperscript{59} \textit{Id.} at 48.
Point sources are an important part of the nutrient problem and states, particularly Maryland, have used their traditional regulatory authority under the Clean Water Act (CWA) to impose stringent Enhanced Nutrient Removal (ENR) technology in new wastewater treatment permits. Clearly, though, most of the Chesapeake Bay problem is attributable to nonpoint sources (as much as 70%), with agriculture being the leading source of pollution and urban development a major and growing contributor.

In addition to its role in regulating wastewater treatment facilities, the traditional regulatory system was an important tool in leveraging the wider Chesapeake Bay cleanup. In 1998, the American Canoe Association and the American Littoral Society sued EPA under §303(d) of the CWA. The consent decree settling the case required EPA to issue total maximum daily loads (TMDLs) for the Chesapeake Bay and its Virginia tributaries if Virginia failed to complete TMDLs for those water bodies by 2010, spurring significant work on Chesapeake Bay issues by the state of Virginia.

Although effluent standards and TMDLs play an important role in the Chesapeake Bay, two factors make the Chesapeake Bay a striking example of new approaches to governance: (1) the extremely large number of organizations involved in the cleanup process; and (2) the wide range of tools that are being used to help improve water quality.

NAPA found that the Chesapeake Bay cleanup strategy requires the joint efforts of the following:

- 6 states, the District of Columbia, and 3,169 local governments;
- 23 federal agencies;
- 678 watershed associations;
- A large number of riverkeepers;
- 2 interstate river basin commissions;
- 30 regional councils (multi-county councils of local governments);
- 36 state-created tributary strategy teams;
- 87,000 farmers;
- 5-6 million homeowners;
- Hundreds of lawn care companies;
- An uncounted number of land developers, homebuilders, construction companies, agribusinesses, and other companies that send pollution to the bay; and
- A very large number of civic and nonprofit organizations.

The diffuse sources of pollution, the scale of the reductions needed to achieve a healthy bay, and the complex intergovernmental arrangements have required governments to deploy an extremely wide range of conventional and unconventional tools to attack the bay’s pollution problems. These tools include identification of clear goals and benchmarks for bay restoration based on extensive scientific analysis, allocation of nutrient reduction responsibilities to each tributary of the bay and establishment of tributary strategies, imposition of new ENR standards for waste water treatment facilities, development of a wide range of best management practices for agriculture and for development activity, establishing new taxes such as Maryland’s flush tax to support cleanup activity, raising funds through private philanthropy, social marketing campaigns to raise public awareness of problems, and to gain support for financing, the introduction of low-impact development concepts, and the use of collaborative decisionmaking.

The complex and elaborate structure developed to attack pollution problems in the Chesapeake Bay reflects a broader trend in which governments have adopted a wide range of “indirect” mechanisms or tools to meet their strategic goals. Lester Salamon observed that

“The heart of this revolution has been a fundamental transformation not just in the scope and scale of government action, but in its basic forms. A massive proliferation has occurred in the tools of public action, in the instruments or means to address public problems. Whereas earlier government activity was largely restricted to the direct delivery of goods or services by government bureaucrats, it now embraces a dizzying array of loans, loan guarantees, grants, contracts, social regulation, economic regulation, insurance, tax expenditures, vouchers and more.”

As Salamon suggests, and the Chesapeake Bay experience illustrates, important shifts have occurred in how government agencies must approach governance. These shifts include moving away from what an agency’s programs require to what tools or instruments can best resolve a particular problem, from the role of agency hierarchies in directing environmental problem solving to the network of organizations that are needed to effectively implement environmental solutions, and shifting from the public sector versus the private sector to the public sector plus the private sector.

This change is illustrated by contrasting NAPA’s version of the logic model traditionally used by EPA for dealing with water quality issues with the logic model of the Chesapeake Bay Program.

65. The Maryland Chesapeake and Atlantic Coastal Bays Restoration Fund is supported by a $2.50 a month fee on sewer bills and a $30 annual fee on septic system owners.

66. See generally id.


68. Id. at 9.

69. Id. at 11. Stephen Goldsmith and William D. Eggers point out that [i]n the twentieth century, hierarchical government bureaucracy was the predominant organizational model used to deliver public services and fulfill public policy... The hierarchical model of government persists, but its influence is steadily waning, pushed by government’s appetite to solve ever more complicated problems and pulled by new tools that allow innovators to fashion creative responses. This push and pull is gradually producing a new model of government in which executive’s core responsibilities no longer center on managing people and programs but on organizing resources, often belonging to others, to produce public value. Government agencies, bureaus, divisions, and offices are becoming less important as direct service providers, but more important as generators of public value within the web of multiorganizational, multigovernmental, and multisectoral relationships that increasingly characterize modern government.


70. Salamon, supra note 67, at 14.
NAPA Logic Model for Traditional Point Source Water Pollution Control

**FEDERAL EPA**
- Provide science
- Set standards for end-of-pipe discharges
- Require permits for treatment plants
- Delegate permit authority to capable state EPA (with some cost sharing)
- Monitor state program delegations

**STATE EPAs**
- With delegated authority
- With some federal funding

**PUBLIC & INDUSTRIAL TREATMENT PLANTS**
- Comply with permits
- Report results
- Newer types of point sources added in recent years (stormwater, feedlots, construction sites)

**WATER BODIES**
- Receive treated water (outputs)
- Quality of water body (outcomes) not directly regulated

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NAPA Logic Model for Nonpoint Source Water Pollution Control

**FEDERAL EPA**
- Responsible for keeping water bodies clean
- Approve water quality standards and state Total Maximum Daily Load (TMDLs) of pollutants that may be discharged into specific water bodies (OUTCOMES)
- Consequence of unclean water bodies = withhold permits or renewals (block future development)
- Delegate responsibility to state EPAs

**STATE EPA**
- Inventory water bodies in states; list those that do not meet clean water standards ("impaired waters")
- Monitor and report the quality of the states' waters
- Maintain the "impaired waters" list
- Set WQS

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71. NAPA, supra note 48, at 20.
72. Id. at 23.
Despite the large amount of money spent on Chesapeake Bay cleanup, the number of entities involved in the cleanup network and several innovative regulatory and voluntary programs, the bay will not meet water quality standards by 2010. The Chesapeake Bay Foundation’s latest State of the Bay report rates progress on pollution issues either as a D or an F. The scale of the nutrient reduction required (70%), the cost of the cleanup (estimated at over $25 billion), the difficulty in finding politically acceptable and effective methods of dealing with agricultural runoff, and rapid development in the region all contribute to making it very difficult to restore the bay. Certainly going forward new regulatory tools will have to be part of the mix in dealing with agricultural runoff and problems related to development, but the scale and the cost of the problem, and the need to find politically acceptable solutions will continue to require a broad range of approaches to improving environmental outcomes.

Chesapeake Bay is only one of several major estuaries where ecosystem-scale restoration efforts are underway or planned. All of these restoration projects face similar challenges in establishing restoration goals, coordinating restoration activities, creating effective collaborative arrangements, funding, finding the right set of tools to solve problems, measuring progress, and involving the public.

2. Minnesota’s Response to Impaired Waters

The issue of impaired waters is not restricted to large, multistate estuaries. Each state in the country is struggling with how to restore its impaired waters. States have identified nearly 40,000 impaired water bodies. Since many states have not yet assessed all of their water bodies—for example, Minnesota has only assessed about 8% of its river and stream miles and only 14% of its lakes—the actual number of impaired waters in the country is much higher.


Chesapeake Bay Foundation, 2007 State of the Bay.

EPA’s Inspector General found that:

[n]ew development is increasing nutrient and sediment loads at rates faster than loads are being reduced from developed lands. Little progress has been reported in reaching nutrient and sediment load reduction goals from developed lands. Judging just the load reductions from implementing the actions laid out in the tributary strategies, about 18 to 28 percent of each reduction goal was reported as being achieved in 2005 for developed lands. At this rate, full implementation of the developed land part of the strategies will not occur until 2028 at the earliest—many years after the 2010 goal.

Office of the Inspector General, supra note 73, at 8.

See NAPA, supra note 48, at 94-103; see also Karen E. Vignostad et al., Northeast Midwest Institute, Large-Scale Ecosystem Restorations: Lessons Learned from Existing and Emerging Initiatives (2005), available at http://www.mewm.org/restoration.pdf.


In Minnesota, phosphorus, mercury, and turbidity are the principal sources of impairment. Only 14% of the impairment causing pollutants in Minnesota are discharged from point sources.

The Minnesota response to impaired waters first required a new consensus on how to address the sources of impairment. Several local governments, burdened by the prospect of significant costs needed to upgrade wastewater infrastructure, had expressed concerns about tightening effluent standards to deal with impaired waters, particularly tighter phosphorus standards. Other interest groups including developers and agriculture were concerned about the prospect of new regulations. Businesses expressed frustration that they were too often the focus of the efforts to reduce pollutant loading through the CWA permitting process, often at very high costs, when the majority of the problem came from lightly regulated or unregulated nonpoint sources. The resulting stalemate over how to deal with impaired waters left the state with very serious water quality problems that affected the ability of cities to expand when their wastewater treatment facilities would contribute to further water quality impairment, affected the tourist industry that is critically important to the state’s economy, and weighed heavily on public values in the “Land of 10,000 Lakes.”

To bridge these gaps, the state Pollution Control Agency, working through a nonprofit organization, the Minnesota Environmental Initiative, convened a diverse stakeholder dialogue which, after two years of negotiations, developed a consensus approach for impaired waters. This

79. NAPA, supra note 48, at 101.
81. In 2003, a Minnesota Court of Appeals significantly limited the ability of expanding suburbs to obtain permits for new wastewater treatment facilities that discharge into an impaired water without fully offsetting any discharges that contribute to the impairment. The court of appeals held that the Clean Water Act prohibited the state from issuing a permit for a new discharge if that discharge would "cause or contribute to the violation of water quality standards." In Re Cities of Anndale & Maple Lake NPDES/SDS Permit Issuance for the Discharge of Treated Wastewater, 702 N.W.2d 768, 773 (Minn. App. 2005). The decision, rendered in the midst of the legislative debate over the Clean Water Legacy Act, provided additional incentive for passage of the Act. The Minnesota Supreme Court later reversed the decision in Inre Cities of Anndale & Maple Lake, 731 N.W.2d 502 (Minn. 2007).
83. The Minnesota Environmental Initiative (MEI) was formed in 1991 with the purpose of bringing professionals from business, government, and environmental communities together to work on partnership-based environmental projects. MEI, Homepage, http://www.mn-ei.org (last visited July 30, 2008). The initiative fosters "creative collaborations in the form of initial dialogues, policy forums and longer-term special projects." Id.
was a historic alliance of parties that had traditionally held very disparate views on how to manage water quality issues in the state. The fact that such a wide range of interests could agree on the basic structure for a statewide impaired waters program resulted in broad bipartisan support for the legislation proposed by the coalition, the Clean Water Legacy Act. It is perhaps the most comprehensive approach to addressing impaired waters in the country.

The legislative findings in the Act reflect the consensus approach used in its development, noting that

(2) achieving the state’s water quality goals will require long-term commitment and cooperation by all state and local agencies, and public and private organizations and individuals, with responsibility and authority for water management, planning, and protection; and

(3) all persons and organizations whose activities affect the quality of waters, including point and nonpoint sources of pollution, have a responsibility to participate in and support efforts to achieve the state’s water quality goals.

This consensus-building approach is a markedly different path than the traditional regulate-permit-inspect-enforce paradigm.

The goals of the Act include assessing all waters of the state within 10 years, prioritizing and targeting restoration activities, using a combination of regulatory and nonregulatory approaches to restoration, and implementing measures that prevent future impairment. The Act places special emphasis on public involvement:

Public agencies and private entities involved in the implementation of this chapter shall encourage participation by the public and stakeholders, including local citizens, landowners and managers, and public and private organizations, in the identification of impaired waters, in developing TMDLs, and in planning, priority setting, and implementing restoration of impaired waters. In particular, the Pollution Control Agency shall make reasonable efforts to provide timely information to the public and to stakeholders about impaired waters that have been identified by the agency. The agency shall seek broad and early stakeholder participation in scoping the activities necessary to develop a TMDL, including scientific models, methods, and approaches to be used in TMDL development, and to implement restoration...

The emphasis on public and stakeholder involvement, including scientific stakeholders, is reinforced by other parts of the Act including: the creation of a multi-stakeholder Clean Water Legacy Council to oversee implementation of the Act; a requirement that the council and state agencies make use of available public and private expertise from educational, research, and technical organizations, including the University of Minnesota; and a requirement that the council develop educational strategies for “informing, educating, and encouraging the participation of citizens, stakeholders, and others regarding the identification of impaired waters, development of TMDLs, development of TMDL implementation plans, and implementation of restoration for impaired waters.” The Act places the burden of implementation on public agencies.

3. Conclusions

Clearly, making progress on impaired waters will require a very broad approach to environmental governance. Traditional regulation and enforcement, including citizen suits, provides the essential context in which a wider range of creative approaches can be used. New effluent discharge limits for industrial sources is key to dealing with over 20% of the nutrient loading problem in Chesapeake Bay. And, the TMDL requirements in the Clean Water Act provide the backdrop against which all other efforts are measured in both the Chesapeake and in Minnesota. But these regulatory approaches cannot, by themselves, produce the dramatic reduction in nutrient loading needed to produce a healthy bay or a clean water legacy for an entire state. Instead, a range of other mechanisms—partnerships, collaboration, information, social marketing, new fees, private philanthropy, best management practices, etc.—must be strategically linked with regulation to have any hope that the desired end result will be achieved.

B. Urban Ozone and Particulate Pollution

Similar to the case of impaired waters, nitrogen oxides (NOx), and volatile organic compounds (VOCs), the precursors of urban ozone, and particulate matter (PM) pollution are emitted by both point sources and nonpoint sources (referred to in air pollution language as area sources). Motor vehicles play a key role in both ozone and particulate pollution. Just as with impaired waters, it has become increasingly important to look to innovative ways of dealing with those diffuse pollution sources. Ozone and PM are two of the most important air pollutants from a public health perspective.

1. Ozone

Ground-level ozone is formed when NOx and VOCs react in the presence of sunlight. The major anthropogenic source

91. Id. §114D.35, subdiv. 2.
92. Id. §114D.35, subdiv. 3.
93. Id.
94. Ozone can cause numerous respiratory health problems for humans including chest pains, coughing, throat irritation, and congestion. U.S. EPA, Ozone—Good Up High Bad Nearby, http://www.epa.gov/air/oaps/gooduphigh/ [hereinafter U.S. EPA, Ozone]. It can exacerbate existing problems with bronchitis, emphysema, and asthma and long-term exposure to ozone can cause permanent scarring of lung tissue. Id. Ozone also damages the ecosystem causing an estimated $500 million in reduced crop production in the United States every year. Id.
95. RICHARD P. TURCO, EARTH UNDER SIEGE: FROM AIR POLLUTION TO GLOBAL CHANGE 78-79 (2d ed. 2002).
of NOx is motor vehicles,96 accounting for 56% of the NOx emissions in the United States.97 Other sources of NOx include fuel combustion processes and utilities, which contribute 17% and 22%, respectively.98 Motor vehicles also make up 45% of total VOC emissions.99 Industrial and commercial processes account for almost all the rest of the VOC emissions at 50%, with the remaining 5% emitted by consumer solvents.100 A significant percentage of VOC emissions come from diffuse sources. For example, the top-10 sources of VOC in Baltimore include degreasing operations, pleasure craft, paints and coatings, portable fuel containers, consumer products, and lawn and garden machinery.101

2. PM

PM is a term for air pollution composed of solid and liquid particles suspended in the air.102 Large, coarse particles with a diameter of 2.5 micrometers (μm)—10 μm are usually composed of soil particles, desiccated cellular debris, spores, and pollen.103 Uncovered soil, unpaved roads, mining operations, and agricultural processes all provide sources of wind-blown dust that constitute coarse particulates.104

Fine particles with a diameter of less than 2.5 μm are mainly composed of products from coal and oil combustion, and can contain heavy metals.105 They can be formed from gases, including sulfur dioxide (SO2), NOx, and VOCs.106 The NOx and VOC sources listed above that contribute to ozone pollution also contribute to PM pollution.

Particulate emissions from diesel engines create particularly important health concerns. A study by the South Coast Air Quality Management District (SCAQMD) found that the air toxics carcinogenic risk in the Los Angeles Basin is as high as 1,400 per million people.107 Emissions from trucks, buses, cars, off-road vehicles, planes, and ships are the dominant source of the risk, with particulates from diesel engines making up 84% of the risk.108 In 2007, a new EPA rule required manufacturers to produce much cleaner diesel engines.109 However, diesel engines have a long life expectancy and many of the pre-2007 engines will be in use for 20 or more years.

Several organizations have pursued innovative approaches to deal with the diffuse sources of ozone and PM pollution, including diesel emissions.

3. Clean Air Minnesota

The Minneapolis/St. Paul region is an attainment area for ozone but came close to exceeding ozone limits on several occasions beginning in the late 1990s. Recognizing this fact, the Minnesota Chamber of Commerce (the Chamber) commissioned a study in 1999 that found the cost to Minnesota businesses of meeting emissions regulations for ozone non-attainment areas under the Clean Air Act (CAA) would be between $189 and $266 million per year should the region slip into non-attainment status.110

The Chamber pursued an unusual path in responding to these potential costs. The organization contacted the state’s largest environmental advocacy organization, the Minnesota Center for Environmental Advocacy (MCEA), to discuss whether MCEA might be interested in developing a collaborative effort to reduce ozone-forming pollutants to reduce the possibility that the region would fall into non-attainment. No doubt, part of the motivation for this tactic was that many of the sources for ozone precursors were non-industrial, allowing at least some of the cost of dealing with ozone to be shifted to organizations other than those represented by the Chamber.111 Still, the idea was intriguing enough that MCEA agreed to join in the effort.

The Chamber and MCEA began with feasibility meetings to which a broad spectrum of stakeholders were invited, including the Minnesota Pollution Control Agency, the American Lung Association of Minnesota, and Minnesota’s largest oil refinery.112 These meetings resulted in a consensus to pursue a collaborative approach to ozone reduction. Clean Air Minnesota (CAM) was created in 2002 to reduce ozone air pollution so that the Twin Cities metropolitan area remained in compliance with federal air pollution regulations and was later expanded to incorporate particulate pollution.

The CAM facilitation process is also unique. The Chamber and MCEA decided to engage the Minnesota Environmental Initiative (MEI) to manage CAM. MEI works with nonprofit, business, and government partners to develop consensus on critical issues and move collectively toward action with positive environmental impacts.113 Both MCEA and the Chamber were members of MEI. Organizational

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96. Id. at 276.
98. Id.
99. Id.
100. Id.
104. WHO Report, supra note 102.
105. PHALEN, supra note 103, at 42-43.
106. Id. at 43.
108. Id.
109. U.S. EPA, Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel
zations that became a member of CAM agree to implement at least one long-term program designed to reduce air pollution emissions and to engage in education and outreach to employees.

CAM developed a range of projects to reduce ozone precursors, including a lawn mower exchange program, a campaign to encourage businesses with large campuses to plant native grasses to reduce lawn mowing, and a public education campaign to dramatically raise awareness of ozone and particulate issues. The largest project, by far, has focused on retrofitting diesel school bus engines.

Project Green Fleet, through a combination of funding from companies and from EPA, retrofitted 500 school bus engines in its first two years of operation and now plans to retrofit a total of 4,000 buses, reducing particulate and other emissions by 30-40%. Project Green Fleet is now beginning to work with county governments to retrofit their diesel trucks and construction equipment. Overall, diesel engines account for only 10% of the vehicles in the state but more than 50% of air pollution from vehicles.

4. Other Collaborative Responses to Diffuse Source Air Pollution

Collaborative efforts have also been part of the response to ozone and PM pollution in non-attainment areas in a host of cities.

- Clean Air Counts in Chicago is a collaborative effort among the Metropolitan Mayors Caucus, city of Chicago, U.S. EPA Region 5, Illinois Environmental Protection Agency and almost 500 public, private and nonprofit partners. This multi-year initiative is designed to achieve specific and

significant reductions in targeted smog-forming pollutants and major reductions in energy consumption. Clean Air Counts established a goal of reducing polluting emissions by five tons per day through adoption of energy-efficient lighting; becoming an energy star partner; participating in a gas can replacement program; trading in gas-powered lawnmowers and leaf blowers for electric, battery-operated, or non-motorized models; using low-VOC building materials, cleaning supplies, and paint; and using natural landscaping methods that minimize the use of mowing, fertilization, and pesticide treatments; participating in a diesel retrofit program; and reducing the number of employees who drive to work on a daily basis by offering alternatives and incentives.

- The Clean Air Force in Austin recruits businesses in Central Texas to voluntarily join and commit to reducing emissions from their organization by 10% within three years. Clean Air Partners helps businesses do this by giving them ideas, including: (1) reducing the number of single-occupant vehicle trips made to the work place by setting up carpooling, vanpooling, public transportation options, bicycling, working from home, flex time, and compressed work weeks; (2) using clean energy and energy conservation strategies; and (3) using clean landscaping practices to avoid using fuel-powered landscaping equipment.

- Clean Air Action in Houston focuses on encouraging ridesharing, using public transit and alternative transportation, and proper vehicle maintenance.

- Spare the Air in San Francisco seeks to educate the public about air pollution and encourages individuals to help reduce air pollution. Spare the Air also has an employer program. Members of the program receive notice of high ozone one and one-half days in advance so that employers can try to reduce the number of employees that commute to work on the high ozone day. Strategies include offering employees the option to telecommute, subsidizing commutes via public transportation, offering free or preferential parking for car-users, and using fuel-efficient vehicles.

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115. Id. The founding partners of CAM included 3M, the American Lung Association of Minnesota, Andersen Corporation, Barr Engineering, the Bush Foundation, the City of Minneapolis, EPA, Flint Hills Resources, Ford Motor Company, Hennepin County, Izaak Walton League of America—Midwest Office, the Metropolitan Council, the Chamber, the Minnesota Department of Health, the Minnesota Office of Environmental Assistance, the Minnesota Pollution Control Agency, Minnesota Power, the Minnesota Technical Assistance Program of the University of Minnesota, Target Corporation, Rock-Tenn (Waldorf Corporation), and Xcel Energy. MEI, Clean Air Minnesota (CAM) Partners, supra note 112.

116. MEI, Clean Air Minnesota (CAM) Partners, supra note 112.


118. Id.


120. Clean Air Counts began in 1999 as a response to the Chicago region's designation as a severe non-attainment area due to repeated violations of the national ambient air quality standards (NAAQS) for ground-level ozone. Clean Air Counts, History, http://www.cleanaircounts.org/history.aspx (last visited July 30, 2008). The program targets nonregulated sources of pollution, including: non-regulated businesses, industries, and institutions; municipal governments; developers; architectural services; property managers; householders; and other governing and taxing bodies with a specific goal of reducing ozone pre-cursor emissions by five tons per day. Clean Air Counts, Goals, http://www.cleanaircounts.org/goals.aspx (last July 30, 2008). Clean Air Counts members employ numerous strategies to reduce emissions and conserve energy. Clean Air Counts, Strategies, http://www.cleanaircounts.org/strategies.aspx (last visited July 30, 2008).


122. Clean Air Counts, History, supra note 120.

123. Clean Air Counts, Strategies, supra note 120.

124. Clean Air Partners is a program developed by the Clean Air Force of Central Texas to reduce air pollution by reducing the number of vehicles that commute. Clean Air Partners, About the Clean Air Partners Program, http://www.cleanairextrx.org/about.html (last visited July 30, 2008).


127. Id.

128. Spare the Air was established by the Bay Area Air Quality Management District (BAAQMD) to alert residents to high ozone days (days when the ozone levels exceed federal standards for healthy air) and to urge them to reduce their polluting activities on those days. Spare the Air, Homepage, http://www.sparetheair.org/ (last visited July 30, 2008).

pools/vanpools, providing safe bicycling options (including showers and lockers at work), and allowing flexible work hours. Employers are also asked to find alternatives to using gas-powered lawn care equipment on ozone alert days. Over 2,000 businesses and government agencies have registered with Spare the Air.\footnote{Spare the Air, BAAQMD, Recognizing Participating Employers, http://www.spartheadair.org/employers/participating-employed.htm (last visited July 30, 2008).}

- The Puget Sound Clean Air Agency (PSCAA) in Seattle\footnote{PSCAA, Homepage, http://www.pscleanair.org (last visited July 30, 2008).} is a special purpose regional agency that works with EPA and the Washington State Department of Ecology to enforce air quality regulations, sponsor voluntary initiatives, and educate the public about clean air. Its Diesel Solutions program, started in 2001, works to reduce diesel emissions by retrofitting vehicles with pollution control equipment, using cleaner fuels, and promoting reduced idling. Transit agencies, school districts, cities and counties, ports, ferries, cruise lines, garbage haulers, and private businesses have all voluntarily joined the Diesel Solutions Program.\footnote{PSCAA, Diesel Solutions, http://www.pscleanair.org/programs/dieselsolutions/default.aspx (last visited July 30, 2008).} Community initiatives sponsored by PSCAA include a program to subsidize a wood stove trade-out to reduce wintertime wood smoke pollution in the town of Darrington.\footnote{PSCAA, Community Initiatives: Darrington, http://www.pscleanair.org/programs/community/darrington/default.aspx (last visited July 30, 2008).} PSCAA also encourages individuals and businesses to take measures to become more energy efficient.\footnote{PSCAA, Energy Solutions, http://www.pscleanair.org/programs/climate/energy.aspx (last visited July 30, 2008).}

- Clean Air Campaign in Atlanta\footnote{The Clean Air Campaign is a nonprofit organization formed in 1996 that works with government agencies and private organizations to reduce air pollution. Clean Air Campaign, About Us, http://www.cleanaircampaign.com/about_us (last visited July 30, 2008).} educates the public about air pollution and encourages voluntary efforts by individuals and businesses to improve the air quality in Georgia. Its efforts are focused on reducing the number of commuters traveling in the traditional one-car one-passenger way. Strategies for commuters include telework, carpooling/vanpooling, public transportation, bicycling, flexible work schedules, car sharing, and the guaranteed ride home program, which provide benefits for people who do not drive their car to work.\footnote{Id.}

5. Conclusion

CAM is a dramatic example of a new approach to environmental governance. It is unique in many ways. It was imagined by a business trade association as a way of avoiding future regulatory costs and involved a partnership that is headed by the business organization and an environmental advocacy group. CAM is facilitated by another nonprofit organization and involves the state environmental agency as a participant in the collaborative. It relied on the state agency for the scientific information underlying the work of the collaborative, but has drawn funding from private organizations and foundations in addition to government financial resources. And it is safeguarded by the fact that if the effort fails to produce emissions reductions that keep the area in attainment, the government will step in and impose emissions reductions through a state implementation plan. The CAM example indicates that creative collaborations can produce important environmental results prior to the time that regulatory thresholds are triggered, creating early pollutant reductions, saving costs, building the public reputation of businesses, and creating a better working relationship among communities, businesses and government agencies.

The other clean air programs incorporate a wide variety of approaches ranging from public education campaigns to voluntary emissions reduction programs to incentives for reducing commutes and trading in highly polluting equipment such as wood-burning stoves or lawn mowers for more efficient versions. Just as is the case for impaired waters, an important regulatory program underlies and provides the impetus for all of these efforts, but the regulatory program is only one part of a much larger effort to reduce urban ozone and particulate contamination.

C. Brownfields Rehabilitation

Brownfields rehabilitation is one of the first areas where significant rethinking about the role of government in leveraging private resources was critical to accomplishing public goals. Over the last few decades, many U.S. cities have undergone immense suburban development, pejoratively termed suburban sprawl by land use academics and city planners because of suburbia’s often unorganized and expansive development patterns. Land use expert James A. Kushner describes America’s subsidization of suburban development as an example of a centrifugal force that has driven metropolitan development farther and farther away from urban centers.\footnote{James A. Kushner, Brownfield Redevelopment Strategies in the United States, 22 Ga. St. U.L. Rev. 857, 858 (2006).} Critics argue that the consequences of unchecked suburban sprawl include vast degradation of green space, significant air and water pollution, increased commutes and congested traffic patterns, and increased CO₂ emissions, as well as diminished tax revenues for urban centers due to the loss of economic and residential development.\footnote{Sierra Club, Stop Sprawl! Sprawl Overview, http://www.sierraclub.org/sprawl/overview (last visited July 30, 2008).} Reversing the negative effects of suburban sprawl requires public and private support for centripetal forces in metropolitan development that focus on urban and central city revitalization.\footnote{Kushner, supra note 137, at 858.}

EPA defines a brownfield as “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.”\footnote{U.S. EPA, About Brownfields and Land Revitalization, http://www.epa.gov/brownfields/index.html (last visited July 30, 2008).} The Agency estimates that there are more than 450,000 brownfield sites in the
United States today. According to EPA, cleaning up and redeveloping brownfield sites in the United States "increases local tax bases, facilitates job growth, utilizes existing infrastructure, takes development pressures off of undeveloped, open land, and both improves and protects the environment." More than one-half of the 200 cities responding to a recent survey reported that if redeveloped, brownfield properties in their jurisdictions could yield an aggregate of $958 million to $2.2 billion in tax revenues annually. As part of the same survey, 91 of the cities responding estimated that up to 149,515 new jobs could be created if their brownfield sites were redeveloped. For environmental and public health purposes, the cleanup and redevelopment of brownfields "eliminates the toxins and physical hazards brought on by idle and contaminated land."

Revitalization of brownfields is an essential element of urban revitalization plans. One study concluded that for every 1 acre of brownfields reused, 4.5 acres of green space is saved.

1. Legal Issues Constraining Brownfields Redevelopment

Despite the fact that brownfields are usually found within the urban core, with access to public transportation, roads, and municipal services because of their previous industrial uses, redevelopment of brownfields has faced many significant obstacles. The most important factors hindering brownfields redevelopment are fears of environmental contamination and potential liability under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also referred to as Superfund. Ironically, although CERCLA was enacted to clean up the nation’s worst hazardous waste sites, it became "a barrier to the redevelopment of an astounding number of industrial sites that pose health and environmental hazards of their own." CERCLA’s complex liability provisions often encourage landowners to choose to abandon or mothball their property rather than redevelop the property, and often drove development to occur on greenfields.

2. Minnesota’s Land Recycling Act

Beginning in the early 1990s, states responded to the growing inventory of brownfield sites by solving three critical problems using new tools that leveraged private interests and resources: (1) potential CERCLA liability associated with financing or undertaking redevelopment of potentially contaminated sites; (2) availability of funding to investigate potential contamination at the sites and to remediate that contamination if found; and (3) access to government staff to approve investigation and remediation plans.

Minnesota’s pioneering Land Recycling Act, passed in 1992, adopted a then very innovative approach to clarifying liability, leveraging private dollars for cleanup, and facilitating government review and approval. The Act provides that

[a person who is not otherwise responsible [under the state Superfund law] for a release or a threatened release will not be responsible... for the release or threatened release if the person undertakes and completes response actions to remove or remedy all known releases and threatened releases at an identified area of real property in accordance with a voluntary response action plan approved by the commissioner [of the Pollution Control Agency].

This language made it very clear that a person intending to develop or finance the development of a site could do so without assuming the risk of unlimited CERCLA liability, the uncertainty that had previously prevented redevelopment of potentially contaminated property. The statutory change allowed the costs of redevelopment to be more clearly calculated, once the extent of contamination was known thereby permitting the developer and financier to determine whether redevelopment was likely to be a profitable enterprise. Since contamination at many of these sites was not extensive and the value of the property for new development was often very high given their location, redevelopment of these properties significantly increased after the passage of the law, almost all supported by private funds. More than 1,200 voluntary cleanups have been completed under the Minnesota voluntary cleanup program.

The Act also set up an important fee-for-services program that provided developers rapid access to state agency staff that could approve the developer’s site investigation and cleanup plans. This arrangement allowed the agency to act quickly on the requests rather than putting these requests in the long queue of CERCLA cleanups, thereby accommodating the tight time schedules often associated with property transactions.

The basic model developed by Minnesota that relied on an understanding of the economics of urban redevelopment was subsequently adopted by most other states and, ultimately, by Congress.

142. Id.
144. Id. at 9.
151. MINN. STAT. §115B.175.
152. Id. §115B.175, subdiv. 1.
3. Federal Brownfields Legislation

Following the lead of many states, Congress passed national brownfields legislation in the Small Business Liability Relief and Brownfields Revitalization Act (the Brownfields Act)\textsuperscript{155} in 2002. The purpose of the new legislation was to “provide certain relief for small business from liability under [CERCLA], and to amend such Act to promote the cleanup and reuse of brownfields, to provide financial assistance for brownfields revitalization, to enhance State response programs, and for other purposes.”\textsuperscript{156}

The new Brownfields Act accomplishes this result by creating defenses to CERCLA liability including an Innocent Landowner Defense, a Contiguous Landowner Defense and a Bona Fide Prospective Purchaser Exemption. The Brownfields Act also provides public incentives to encourage brownfield redevelopment.\textsuperscript{157} The Act originally authorized $200 million per year for an EPA-administered program to provide grants in order to assess and clean up abandoned or underutilized brownfields.\textsuperscript{158}

The Brownfields Act also provides tax incentives for redevelopment. The federal brownfields tax incentive was originally passed as part of the Tax Relief Act of 1997. This federal tax incentive allows a taxpayer to fully deduct expenses for environmental cleanup in the year the costs were incurred, rather than spreading them out over a period of years.\textsuperscript{159} To qualify for the incentive, a property must meet two main requirements. First, the property must either be held by the taxpayer incurring the eligible expenses for use in a trade or business or for the production of income or, it must be properly included in the taxpayer’s inventory.\textsuperscript{160} Second, hazardous substances or petroleum must be present or potentially present on the property in question.\textsuperscript{161} This is known as the contamination requirement.\textsuperscript{162} These requirements essentially exclude properties owned for personal purposes. In December 2006, President George W. Bush signed the Tax Relief and Health Care Act of 2006,\textsuperscript{163} which extended the federal brownfields tax incentive through December 31, 2007, and also included petroleum products as eligible for expensing under the contamination requirement.\textsuperscript{164} The federal government estimates that the federal brownfields tax incentive would decrease tax revenue by $300 million annually while returning up to 8,000 brownfields sites to productive use.\textsuperscript{165}

4. Additional Tools to Encourage Brownfields Redevelopment

The continued suburban expansion of many cities over the past 40-plus years has resulted in a variety of adverse side effects. Long commutes, high transportation costs, increased air pollution, and ever-worsening traffic have lead communities to consider smart growth programs that focus on revitalization of urban centers.\textsuperscript{166} One of EPA’s smart growth strategies has been to encourage brownfields redevelopment. In fact, EPA believes that “[b]rownfield redevelopment is an essential component of smart growth, as both seek to return abandoned and underutilized sites to their fullest potential as community and economic assets.”\textsuperscript{167} In 2002, 2003, and 2004, EPA awarded special grants to communities to incorporate smart growth into planning, revitalization, and redevelopment efforts, but the Agency has not offered any such grants under this program in the last three years.\textsuperscript{168}

Portland, Oregon, is one of the most successful examples of smart growth development programs in practice. In Portland, a strict urban growth boundary (UGB) has generated high demand for inner-city and downtown redevelopment.\textsuperscript{169} Because Portland was home to a large number of brownfields sites, EPA selected the city in 1996 for a national brownfields pilot grant.\textsuperscript{170} Since then, Portland has become a model for brownfield revitalization. Much of Portland’s success is due to the city’s realization that brownfields and smart growth go hand-in-hand: “For every Brownfield redeveloped inside the [Urban Growth Boundary], sprawl to surrounding farm and forest land is reduced, air and water quality are improved, and jobs and income in the urban core area are increased.”\textsuperscript{171}

Environmental insurance is another interesting program that can shield developers from liability during cleanup and redevelopment of brownfields. The brownfields legislation has helped open the insurance market by allowing costs of cleaning up these sites to be more easily quantified and, therefore, the risk for insurers better understood. Environmental insurance in the brownfield context can be generally broken down into three types of policies: (1) cleanup cost cap; (2) pollution liability; and (3) secured creditor.\textsuperscript{172}


\textsuperscript{157} 42 U.S.C. §9604(k), ELR STAT. CERCLA §104(k).

\textsuperscript{158} Tanck, supra note 149, at 1363.


\textsuperscript{161} Id.

\textsuperscript{162} Id.

\textsuperscript{163} H.R. 6111, 109th Cong. (2006).


\textsuperscript{165} See Farah Rodenberg, Brownfields Programs and Tax Incentives Are Stimulating the Redevelopment of Brownfields Properties in North Carolina and South Carolina, 13 SOUTHEASTERN ENVTL. L.J. 119, 128-29 (2005).

\textsuperscript{166} Kushner, supra note 137, at 864.


\textsuperscript{168} Id.

\textsuperscript{169} Kushner, supra note 137, at 865.


Cleanup cost cap protects the developer from absorbing unforeseen cleanup costs that exceed original estimates.\textsuperscript{173} Pollution liability protection helps safeguard developers and long-term owners of revitalized brownfields from suits stemming from pollution on the property.\textsuperscript{174} Finally, secured creditor policies benefit lenders by guaranteeing loan repayments should a borrower default on loan payments because of a pollution condition.\textsuperscript{175}

In the last decade, states began to institute their own environmental insurance programs. However, as of 2006, there were only four state environmental insurance programs in effect—(1) Connecticut; (2) Massachusetts; (3) New York; and (4) Wisconsin—although many other states were in the process of looking into setting up their own insurance programs in the future.\textsuperscript{176} One major difficulty with environmental insurance programs for brownfields is that no two brownfields sites are the same, requiring each site to have a specifically tailored insurance policy. This reality prevents public and private insurers from forming generic insurance policies, an option that would reduce the cost of environmental insurance and make the insurance program more affordable for both providers and developers.\textsuperscript{177} And, as a seminal U.S. Department of Housing and Urban Development (HUD) feasibility study on environmental insurance put it: “[S]o long as environmental insurance is not systematically included in the portfolio of tools strategically employed to promote brownfield redevelopment, neither large nor small [brownfields] will reach their full potential.”\textsuperscript{178}

5. Examples of Brownfield Rehabilitation Projects

Three brownfields initiatives provide an important perspective on the leveraging power resulting from thinking differently about how to create incentives to redevelop urban property.

a. Atlantic Station

For the past century, the Atlantic Steel mill operated on a 130-acre tract located in downtown Atlanta.\textsuperscript{179} The steel mill officially closed in 1998 and after three years of extensive cleanup efforts, EPA finally certified the site as safe for construction in December 2001.\textsuperscript{180} After conducting a thorough investigation of the site, the property was remediated under a set of risk-based cleanup criteria tailored to site-specific future use.\textsuperscript{181} Following the cleanup and remediation of the site, and after another $250 million was spent on investment in roads, sewers, and utility lines, construction on Atlantic Station finally began in 2002.\textsuperscript{182} Atlantic Station is said to be the largest remediation of a brownfield in the history of the United States.\textsuperscript{183}

The idea for Atlantic Station was first conceived in 1996, and when completed it will include 5,000 residential units (including luxury condos as well as less-expensive townhouses and apartments), six million square feet of Class A office space, two million square feet of retail and entertainment space, 1,000 hotel rooms, and 11 acres of public parks.\textsuperscript{184} As of the summer of 2006 Atlantic Station’s population was 3,000 and about 40% of the site redevelopment had been completed. The development has received brownfields redevelopment awards from both EPA and the Sierra Club. Atlantic Station has been cited as a national model for brownfield revitalization.\textsuperscript{185}

b. Clearwater, Florida

The Clearwater Brownfields Area, home to the area’s largest concentration of minority residents and once a thriving business center, had deteriorated over the last 30 years into place of abandoned land, gas stations, dry cleaning facilities, and print shops.\textsuperscript{186} With a current population of 109,000 residents, Clearwater used to be the center for canning, packing, and shipping citrus fruits grown in the region.\textsuperscript{187} Clearwater’s brownfields revitalization efforts began in 1996 when Clearwater was awarded a $100,000 pilot grant from EPA.\textsuperscript{188} After receiving an additional $100,000 from EPA in 1998, Clearwater leveraged more than $9 million in additional federal, state, and local funding by 2001.\textsuperscript{189}

Clearwater’s focus on environmental justice has been one of the most unique aspects of its brownfields initiative. Rather than simply rehabilitate individual parcels of land, Clearwater used a communitywide planning process that engaged a broad cross section of the community in thinking about how to rebuild. This plan developed in four phases:

- Phase 1: Conceptualizing, planning, and establishing principles and values that guide the project;
- Phase 2: Empowering and educating the community;
- Phase 3: Establishing economic, community, and land use strategies to address priorities developed by the community and the local government; and

173. Id.
174. Id.
175. Id.
177. Id.
178. Id.
182. Lisa Chamberlain, Building a City Within the City of Atlanta, N.Y. TIMES, May 24, 2006.
183. Chamberlain, supra note 179, at 251.
185. Pouncey, supra note 179, at 248. For more information on the progress of this site, see http://www.atlanticstation.com.
187. Id.
Phase 4: Bringing stakeholders together to work toward implementing the plan.\textsuperscript{190}

Among the unique results of the Clearwater collaborative effort was building a health clinic as part of the brownfields rehabilitation to meet a critical community concern.\textsuperscript{191} Clearwater has remained a model for successful brownfields cleanup and redevelopment, and was awarded $400,000 in Assessment Grants by EPA in 2007.\textsuperscript{192}

c. Habitat for Humanity

In the mid-1990s one of Habitat for Humanity International's (Habitat's)\textsuperscript{193} most prolific chapters, the Twin Cities Chapter, found it increasingly difficult to acquire affordable building lots in Minneapolis and St. Paul. This led to an innovative alliance between a brownfields redevelopment program run by the MEI and Habitat. MEI's program, Resources for Redevelopment, links engineering firms with nonprofit organizations seeking to develop brownfields site, and provides the NGOs with a volunteer consultant who can help access the necessity for, and cost of cleanup. The MEI/Habitat partnership, supported by EPA funding, allowed Habitat to expand the number of sites available to it for new homes, advanced the goal of infill development, and resulted in the removal of contaminated soils at several sites. This primarily private effort led by two NGOs with the assistance of engineering firms who volunteered their time is an important example of how government can leverage its influence through legislation providing needed liability protection (here state-level legislation) and targeted funding that primes the pump for significantly greater private-sector funding.

The partnership that developed in Minnesota later became a nationwide program when Habitat officially partnered with EPA in 2002.\textsuperscript{194} The memorandum of understanding between EPA and Habitat is a general agreement on "coordinating policies to enact assessment and cleanup of brownfields, to promote community revitalization with residential energy efficiency, and to provide affordable housing for low-income people . . ."\textsuperscript{195} Beyond environmental benefits, Habitat's brownfields partnership with EPA is especially important for addressing the environmental justice consequences of abandoned or underutilized brownfield sites.

Habitat's brownfields initiative has spawned many success stories across the nation including Habitat East Bay in East Oakland, California.\textsuperscript{196} Before redevelopment, the site had been a former junk yard and gardening outlet, and had since become contaminated with pesticides, lead, and petroleum.\textsuperscript{197} After an extensive three-year cleanup, Habitat East Bay was approved to begin building 26 single-family homes on the property.\textsuperscript{198} In 2007, EPA approved a $200,000 grant to Habitat East Bay to continue cleanup plans on different areas of the site.\textsuperscript{199} Other notable Habitat for Humanity affiliates pursuing brownfields redevelopment are located in Minneapolis/St. Paul, Minnesota; Washington, D.C.; Charlotte, North Carolina; Denver; and San Francisco.\textsuperscript{200}

6. Conclusion

Solving the brownfields problem was essential for important policy reasons including revitalization of urban centers, limiting sprawl, and ultimately responding to important concerns like environmental justice and the need for affordable housing in areas with easy access to public transportation and jobs. The key to success for these programs was rethinking the role of government and building new collaborative programs. The CERCLA program and its accompanying liability standards are not only critical to ensuring that dangerous hazardous waste sites are cleaned up, but, perhaps more importantly, changing the hazardous waste management practices in the country to prevent future contamination. But CERCLA's side effects needed to be addressed to enable brownfields redevelopment. By better understanding the liability protections and the degree of certainty developers, banks, and insurers needed, new laws could be enacted that preserved the core purpose of CERCLA but provided the opportunity for private developers and their financiers to bring hundreds of millions of dollars in new financing to urban redevelopment projects.

D. Managing Nanotechnology Development\textsuperscript{201}

Nanotechnology presents a very different challenge than the preceding case examples to the nation's traditional modes of regulation—the speed at which the technology is developing. Nanotechnology innovation is occurring very rapidly, with new products coming to the market monthly and whole new generations of technology expected within the span of a few years. The International Risk Governance Council (IRGC) notes that "innovation in the field of nanotechnology development is far ahead of the policy and regulatory environment, which is fragmented and incomplete at both the national and international levels."\textsuperscript{202} In its study, Managing the Effects of Nanotechnology, the Woodrow Wilson International Institute for Scholars

\textsuperscript{190} INTERNATIONAL CITY/COUNTY MANAGEMENT ASSOCIATION, RIGHTSIDE THE WRONG: A MODEL FOR ENVIRONMENTAL JUSTICE IN BROWNFIELDS REDEVELOPMENT 42 (2002).

\textsuperscript{191} U.S. EPA, BROWNFIELDS, supra note 186, at 1.

\textsuperscript{192} U.S. EPA, CLEARWATER'S REVITALIZATION SPECTRUM, supra note 188.

\textsuperscript{193} Habitat is an ecumenical Christian ministry dedicated to providing simple, decent housing to people who otherwise could not afford to own their own home.


\textsuperscript{195} Id.


\textsuperscript{197} Id.

\textsuperscript{198} Id.


\textsuperscript{201} Parts of the discussion on Managing Nanotechnology Development are derived from Lee Paddock, Keeping Pace With Nanotechnology: A Proposal for a New Approach to Environmental Accountability, 36 ELR 10943 (Dec. 2006), reprinted by permission.

\textsuperscript{202} INT'L RISK GOVERNANCE COUNCIL, NANOTECHNOLOGY RISK GOVERNANCE: RECOMMENDATIONS FOR A GLOBAL COORDINATED APPROACH TO THE GOVERNANCE OF POTENTIAL RISKS 13 (2007) [hereinafter NANOTECHNOLOGY RISK GOVERNANCE].
pointed out that "[the rapid development of [nanotechnology] also means that government managers always will be operating with outdated information, and that data about [nanotechnology] effects will lag behind commercial applications. Priorities for research and for regulation will need to shift constantly."

The impact of rapid technology innovation is not an entirely new phenomenon for regulatory agencies. In the mid-1990s Intel became one of the early participants in EPA’s Project XL program to help develop a new approach to air permitting that could accommodate the rapid change in computer chip technology that might necessitate new industrial processes every 18-30 months. Standard government permitting processes often could not accommodate this short product cycle. As a result, Intel negotiated a more flexible plantwide limit for emissions for its facilities that allowed the company to change product lines and processes as long as it held total emissions below the plantwide cap.

In return, Intel agreed to involve members of the surrounding community in discussions about the emissions limits, increased access to information about the performance of the facilities, and agreed to environmental performance standards beyond those that would otherwise be required by law. The XL agreement thus leveraged private economic incentives, here facilitating Intel’s need to move new products rapidly into production—to achieve better environmental results.

Nanotechnologies, however, present a more complex problem since there are literally hundreds of such technologies under development, little is known about the health and environmental impacts of nanomaterials, and new materials will be introduced to the market very quickly. While government will need to play an important role in health and environment research and through regulatory programs such as Toxic Substances Control Act (TSCA) and Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), it is likely that government will have to use a variety of other governance tools to protect human health and the environment.

1. Background on Nanotechnology

EPA defines nanotechnology in the following way:

[Research and technology development at the atomic, molecular, or macromolecular levels using a length scale of approximately one to one hundred nanometers in any dimension; the creation and use of structures, devices and systems that have novel properties and functions because of their small size; and the ability to control or manipulate matter on an atomic scale.]

A nanometer is one billionth of a meter. To put this into perspective, the diameter of a human hair is about 100,000 nanometers and a human red blood cell about 1,000 nanometers. Nanoscale materials have physical, chemical and biological characteristics that differ fundamentally from larger particles, creating novel mechanical, optical, magnetic, and electronic properties.

The anticipated scale of the nanotechnology industry is exceptional. The IRGC notes that "[n]anotechnology has the potential to become one of the defining technologies of the 21st Century." Envisaged breakthroughs for nanotechnology include order-of-magnitude increases in computer efficiency, advanced pharmaceuticals, biocompatible materials, nerve and tissue repair, surface coatings, catalysts, sensors, telecommunications, and pollution control.

As of May 2007, 475 consumer products were using nanotechnology. This number had doubled from the 212 products counted only 14 months earlier. In 2005, nanotechnology was incorporated into more than $30 billion in manufactured goods. It is estimated that this number will increase to $2.6 trillion by 2014. On the international scale, the United States leads with 52% of the consumer products produced. Inside the United States, the top-four nanotechnology states are California, Massachusetts, New York, and Texas. Moreover, 47 of 50 states in the United States have at least one university, company, government lab, or organization working on nanotechnology. In total, the U.S. government has invested around $5.5 billion in nanotechnology through the year 2006, with an additional $1.3 billion requested for 2007 alone.

More than 30 countries have nanotechnology initiatives including many traditional industrial powers and less likely candidates such as Ukraine and Mexico. Research and development investments by industry worldwide are currently at the same level as government investment but these private investments are increasing at a higher annual rate.

Nanotechnology development appears to have become a race in which no nation, no state, and no major company wants to be left behind. For example, the United Kingdom’s Strategy for Nanotechnology concluded that “the field of nanotechnology and its applications is crucial to the future competitiveness and productivity of the UK economy, and
to the well being and prosperity of its people. And, the U.S.-based Nanotechnology Alliance observed:

[The countries that demonstrate the highest level of innovation and capture the most value from nanotech progress will exert a very significant level of influence on the global geopolitical landscape. For us to maintain our quality of life and global leadership position, the U.S. must play, not just to participate in, but to win the international nanotechnology race.]

State after state has enacted legislation trying to secure a competitive advantage in the industry using tax credits, emerging technology funds, direct appropriation to university research centers, authorizing access to funding from Economic Development Banks, and creating cabinet-level positions to help the state cultivate and expand growth industries such as nanotechnology.

The dramatic investments in nanotechnology development reflect the potential benefits (and therefore the potential financial windfall) from nanotechnologies.

2. Potential Benefits

The development of nanotechnology will have significant effects on many facets of our lives including the environment, medicine, electronics, and an ever-expanding list of consumer products. Because fundamental life processes occur at the nanoscale, nanotechnology offers an ideal medium for fighting diseases. Advanced drug-delivery systems incorporating nanotechnology would theoretically be able to direct drug molecules only to where they are needed in the body, a technique that would greatly reduce the side effects of a treatment such as chemotherapy.

Nanotechnology is also considered one of many tools that can help address the energy crisis. Nanotechnology will be used to enhance our abilities to capture, store, and distribute energy more efficiently. In the near-term, one of the most realistic uses of nanotechnology in the production of clean energy involves the development of more efficient solar panels. The company Nanosolar, which is engaged in perhaps the most ambitious private effort to enhance commercial solar technology through the use of nanotechnology, has attracted millions of dollars in grants and investments. Nanosolar's goal is to be able to mass produce its thin-film solar panels, which are not only 100 times thinner than traditional solar panels, but also significantly more efficient.

Beyond solar panels, nanotechnology has also shown promise in significantly enhancing the storage capacity of batteries, a development that could make hybrid cars even more attractive in the future. Scientists are also looking into the possibility of improving energy transmission efficiency by applying nanocoating to wires to reduce lost energy as it moves down the line.

Nanotechnology could also become an important part of the cleanup of contaminated and hazardous waste sites. EPA states that because of enhanced reactivity, surface area, subsurface transport, and/or sequestrian characteristics of nanomaterials, the benefits of nanotechnology could include more rapid or cost-effective cleanup of wastes. On a related point, nanotechnology is also being used to create more powerful sensors that can accurately detect contaminants in the environment at very low concentrations.

While the potential societal benefits from nanotechnologies are profound, the risks associated with the technologies are also significant, especially in light of the fact we still know little about how exposure to nanomaterials may affect either health or the environment.

3. Potential Risks

Because nanomaterials are so small, they may have the ability to enter human cells and even alter biological processes on the cellular level. Research has shown that nanomaterials can be hazardous to living organisms both because of their size and because of their toxicity. However, it is still unknown exactly how nanomaterials may affect humans and other living organisms after long-term exposure. Even sunscreen, a popular nano-enhanced consumer product, has come under scrutiny as researchers are testing the long-term exposure to sunscreen to see if nanoparticles in the substance could enter the skin and possibly damage deoxyribonucleic acid (DNA) in human cells. Nanomaterials could also pose future danger to the environment. Because the toxicity of nanoparticles is not yet fully understood, serious environmental contamination could occur if nanoparticles are released into the environment without proper regulation and risk oversight government.

The IRGC recently observed: "We still have only a limited understanding of passive nanomaterials’ potential environmental, health and safety risks but active and more complex nanostructures require a far greater level of knowledge to assess potential risks.”

224. 2003 Or. Laws 725 §114(b).
228. Id.
229. Id. at 26.
232. Id.

233. Green Nanotechnology: It’s Easier Than You Think, supra note 218, at 28.
234. Id.
236. Id. at 24.
238. Id.
240. Dennis, supra note 227, at 96.
4. Governance Considerations

Given the speed at which technology is developing and the pressure to be first to market, it seems clear that the regulatory system, by itself, cannot be relied upon to manage the environmental and public health consequences of nanotechnology or to create the level of public confidence needed to ensure the viability of the industry, even if the regulatory system were to be seen as the most desirable method for assuring environmental and health protection.

This is not just a problem for regulators and the public; it is also a problem for the industry. In addition to punishing wrongdoing, regulatory systems help build public confidence in an industry, especially an industry that may involve significant risks. Over the last decade, a number of industries have faced public confidence challenges with varying results. In the 1990s, the use of bovine growth hormones became a significant issue in the United States. While the controversy has largely subsided, a number of milk products are now labeled "BGH Free" to address concerns of some consumers. Genetically modified organisms (GMOs), including such products as seed that can tolerate certain herbicides, have been similarly controversial. Concerns range from GMO "out crossing" in which GM crops cross-breed with non-GMO plants, changing the non-GMO plant's characteristics, to fears about the potential effect of GMO foods on health, to the impact that patented GMO seeds may have on the cost of seed for farmers in developing countries. Although GMO companies have overcome these concerns in the United States, public and political concerns resulted in a long delay in introducing GMO seeds in Europe. Nanotechnologies face a similar risk, at least in significant part because so little is known about the effects of these technologies.

While a biotechnology type backlash has not yet affected nano-manufacturers, the level of uncertainty about the effects of some nanotechnologies, the fact the public knows little about nanotechnologies, the lack of a clear management approach that can allay public concerns, and the potential health and environmental effects of some nanomaterials all create the setting for a nano-backlash. It certainly appears to be in the best interest of the industry to work with government, NGOs, and others to create and implement a credible governance system that can build and maintain public confidence in the industry.

5. Governance Tools

Because of the speed at which the industry is growing and the range of materials and technologies that are part of the growing nano-revolution, a systematic approach to environ-

mental governance is particularly important. If traditional government mechanisms cannot keep up with the industry, the environment and public health must be protected, and public confidence must be created through a more comprehensive approach.

a. Government Regulation

Government regulation must be part of the accountability system both to assure the environment and public health is protected and to build and maintain public confidence in the industry. Given the political stalemates that have occurred on environmental issues over the past few years, it is unlikely that major new legislation addressing nanotechnology will be adopted in the United States in the foreseeable future absent a dramatic incident involving nanomaterials.

Several environmental statutes, including the CWA, the CAA, TSCA, FIFRA, CERCLA, and the Resource Conservation and Recovery Act, may apply to nanomaterials, although each of the statutes has limitations in this context. The inability to detect and monitor many nanoscale materials complicates the use of existing regulatory programs. And, given the pace at which the industry is evolving, reliance on traditional permitting approaches, which may take months or even years to complete for a new industrial process, could adversely affect competitiveness in the context of a rapidly developing global market and therefore may be strongly resisted.

The American Bar Association's Section on Energy, Environment, and Resources Law analysis of existing environmental statutes, as well as the analysis by other organizations such the Environmental Law Institute, indicates that these existing statutes are useful, but imprecise, mechanisms for dealing with various aspects of several nanotechnologies. Regulation of nanotechnology, given the rapid changes within the industry, is likely to be an ongoing process, with approaches evolving over time.

EPA suggests a more product-oriented rather than emissions-related approach to managing the potential impacts of nanotechnologies:

Pollution prevention is a critical area to engage EPA resources and expertise as nanotechnology industries form and develop. It is critical that EPA apply the principles of green chemistry, green engineering, and environmentally benign manufacturing in EPA's approach to nanotechnology. EPA has the opportunity to work with stakeholders to apply approaches of pollution prevention and product stewardship to nanotechnology development, so that emissions and risks are reduced as productivity and the economy grow.

b. Public Involvement and Dialogue

If the nanotechnology industry does not address issues of public confidence in the technology, it may suffer the same
fate as that of genetically modified seed crops in the European Union: rejection by the public as unsafe even though the scientific consensus identified little risk.\textsuperscript{251} While regulatory schemes play a role in engendering public confidence, confidence is primarily an issue of values and of political and economic power. If opinion leaders view a product as antipathetic to the values they hold, products may either be banned from the market or may not survive, regardless of the actual risk involved. The specter of unfounded public rejection suggests that accountability tools must be identified that create public confidence in the industry.

A systematic approach to environmental governance for nanotechnologies requires constructive interaction among industry, government, advocacy organizations, and other public stakeholders. Prof. Gregory Mandel espouses a concept he calls dialogue and deliberation, in which representatives of all of the interest groups engage in a "culture-conscious" dialogue that focuses on values, not just competing scientific claims about benefits and risks.\textsuperscript{252} The goal of the dialogue is "to help different groups learn about each other and each other's views, with a goal of cultural accommodation and understanding. Once these objectives have been achieved, a substantive policy deliberation can begin, aimed at developing widely acceptable policy solutions."\textsuperscript{253}

The Royal Society and Royal Academy of Engineering issued a similar call for public dialogue and debate on nanotechnology issues in its groundbreaking 2004 study of the industry:

The general case for wider societal dialogue about novel technologies, and with its greater openness about science policy, rests on three broad sets of argument. . . . The normative argument proposes that dialogue is a good thing in and of itself and as such forms a part of the wider democratic processes through which controversial decisions are made. . . . The instrumental argument suggests that dialogue, as one means of rendering decision-making more open and transparent, will increase the legitimacy of decisions and through this generate secondary effects such as greater trust in the policy-making process . . . . Finally, the substantive argument is that dialogue will help generate better quality outcomes. In the field of environmental risk, non-technical assessments and knowledge have been shown to provide useful commentary on the validity or otherwise on the assumption of experts.\textsuperscript{254}

The Royal Society noted that with many mature technologies public dialogue has often arrived "too little too late" to be effective.\textsuperscript{255} With nanotechnology there is a unique opportunity to avoid the problem of too little, too late.

The IRGC has also suggested a stakeholder-based dialogue,\textsuperscript{256} and the Natural Resources Defense Council, Inc. (NRDC) and Environmental Defense have called upon both government and industry to do a better job of "engaging the broad array of stakeholders outside government and industry—labor, health organizations, consumer advocates and environmental NGOs— whose constituencies stand to be both beneficiaries of this new technology and those most likely to bear any risks that arise."\textsuperscript{257}

Dialogues engage surrogates for the general public, but it is also important to find ways to engage interested members of the general public directly. Better public education is an important element of a new public dialogue on nanotechnology. Education in this context cannot simply be a one-way effort to convince the public that nanotechnology has important societal benefits and is safe. Instead, the education process must be part of the dialogue, requiring "innovative approaches to information provision, ones that involve a genuine two-way engagement between scientists, stakeholders and the public."\textsuperscript{258}

Engaging a broad public in an esoteric issue like nanotechnology is difficult. Still, the Internet offers intriguing possibilities for a new form of two-way dialogue with the broader public. Such a dialogue could start with a website on which the best and most credible information on the developments in nanotechnology is regularly posted. This could include up-to-date information on both the risks and benefits of nanotechnologies, information about developments in government regulations, and information about industry standards and self-regulation approaches. The broader public could then use the site to comment on proposed regulations or on issues that could be addressed by members of the industry.\textsuperscript{259}

Assuring that adequate information is developed and disseminated on the health and environmental impacts of nanotechnology is critical to public credibility and an essential element of environmental governance, as is better detection and monitoring technology.

c. Voluntary Programs

Industry leadership programs can play an important part in environmental governance for nanotechnologies. Recognizing that environmental behavior is driven by factors beyond command-and-control regulations, EPA and many states have developed voluntary environmental leadership programs. The incentives for participating in these programs may include public recognition, improved working relationships with government agencies, penalty avoidance through auditing and self-reporting, and regulatory flexibility. As an emerging industry, it may useful for EPA, industry leaders, and NGOs to consider the role that leadership programs could play in motivating desired environmental behavior.

Programs such as Occupational Safety and Health Administration's (OSHA's) Star Program,\textsuperscript{260} EPA's Performance Track,\textsuperscript{261} the Green Tier\textsuperscript{262} in Wisconsin, and the

\textsuperscript{251} Malcolm Grant, 2005 Kerlin Lecture, 9 GREENLAW 7 (2006).

\textsuperscript{252} Mandel, supra note 245, at 178.

\textsuperscript{253} Id.

\textsuperscript{254} ROYAL SOC'y & ROYAL ACADEMY OF ENGINEERING, supra note 246, at 63.

\textsuperscript{255} Id. at 64.

\textsuperscript{256} NANOTECHNOLOGY RISK GOVERNANCE, supra note 202, at 18-19.

\textsuperscript{257} John Baius et al., Getting Nanotechnology Right the First Time, 21 ISSUES SCI. & TECH. 70 (2005).

\textsuperscript{258} ROYAL SOC'y & ROYAL ACADEMY OF ENGINEERING, supra note 245, at 66.


\textsuperscript{262} See Wis. Dep't of Nat. Resources, Green Tier, http://www.dnr.state.wi.us/org/caer/cea/environmental (last visited July 30, 2008).
Clean Corporate Citizen\textsuperscript{263} program in Michigan are examples of well-developed leadership programs. EPA's Energy Star\textsuperscript{264} program is another example of a leadership program, although one that exists in an area entirely unregulated by EPA.

The IRGC suggests that "[l]industry, governments, and other stakeholders must collaborate now to lay the foundation for later regulatory action and to assess the potential for international voluntary agreements.\textsuperscript{265} In the United States, Environmental Defense and DuPont have led the way in creating a risk governance structure for nanotechnology development with their Nano Risk Framework.\textsuperscript{266}

d. Liability

Nanotechnologies will face the threat of legal liability under nuisance, negligence, or strict liability theories if their use causes harm to public health or the environment. The potential for civil liability is a key element of governance because government resources to deal with environmental problems are shrinking at the same time as environmental threats are increasing. The civil liability system plays a critical role in tempering corporate decisions to introduce potentially risky products into the market prematurely.

Liability can be mitigated by a robust regulatory regime that will encourage courts to view compliance with the regulatory scheme as establishing reasonable care on the part of the industry. The risks of civil liability can also be minimized by increased transparency.

The prospect of liability for harm to public health or the environment will be an important governance tool for the nanotechnology industry. But, equally important, the industry has the opportunity to minimize that liability by employing mechanisms such as public reporting and early public involvement.

e. Industry Codes and Self-Regulation

Industries have increasingly turned to codes of conduct and industry self-regulation as a means of assuring compliance with environmental laws, maintaining their reputation, reducing the risk of legal liability, enhancing relationships with government agencies, minimizing exposure to penalties, and building public confidence. These codes and self-regulatory mechanisms are important accountability tools, especially if the codes or self-regulatory mechanisms increase the amount of information available to the public. Modern industry environmental codes trace their origin to the Coalition for Environmental Responsible Economies (CERES) and its CERES Principles adopted in response to the Exxon Valdez disaster.\textsuperscript{267} The American Chemistry Society (ACS, then the Chemical Manufacturers Association)

 adopted its Responsible Care\textsuperscript{268} program at least in part to deal with increasing public concern about the chemical industry growing out of the disclosure of the role of discarded chemicals in groundwater contamination during the late 1980s. Responsible Care\textsuperscript{268} is a mandatory program for all ACS members and is practiced in 52 countries.\textsuperscript{269} The Forest Stewardship Council, an NGO, developed a code for sustainable forestry practices and certifies compliance with its code to deal with the fact that forest management practices were often little regulated.\textsuperscript{270}

Given the likely limitations on the government's ability to respond to nanotechnology, self-regulation is important to avoiding potential adverse impacts from nanotechnology and to build public confidence in the industry. Both the NRDC and Environmental Defense have recognized the importance of corporate standards of care:

Even under the most optimistic scenario, it appears unlikely that federal agencies will put into place adequate provisions for nanomaterials quickly enough to address the materials now entering or poised to enter the market. Out of enlightened self-interest, industry must take the lead in evaluating and managing nanomaterial risks for the near term, working with other stakeholders to quickly establish and implement life cycle-based "standards of care" for nanomaterials.

These standards should include a framework and a process by which to identify and manage nanomaterials' risks across the product's full life cycle, taking into account worker safety, manufacturing releases and wastes, product use, and product disposal. Such standards should be developed and implemented in a transparent and accountable manner, including publicly disclosing the assumptions, processes, and results of risk identification and risk management systems.\textsuperscript{271}

6. Conclusion

The development of nanotechnologies presents a unique governance challenge in that the very diverse industry is likely to evolve faster than government is able to respond using its traditional regulatory tools. In addition, the industry's self-interest in preserving public confidence adds a different dimension to the governance discussion. Effective environmental governance for nanotechnology, and perhaps other new technologies in a world of fast moving and global technical innovation, likely will require a combination of government regulation, better information, new means of public involvement, voluntary programs, legal liability exposure, and corporate self-regulation to protect public health and the environment.

a. Learning From the Case Examples

Each of the case studies demonstrates the importance of thinking about governance broadly and deploying a very wide range of approaches to help solve major environmental problems. For example, tougher regulation of point sources,

\begin{itemize}
  \item \textsuperscript{264} See Energy Star\textsuperscript{6}, Homepage, http://www.energystar.gov (last visited July 30, 2008).
  \item \textsuperscript{265} NANOTECHNOLOGY RISK GOVERNANCE, supra note 202, at 17.
  \item \textsuperscript{266} Environmental Defense Fund, Corporate Partnerships, http://www.environmentaldefense.org/page.cfm?tagID=1459 (last visited July 30, 2008).
  \item \textsuperscript{267} See Ceres, Homepage, http://www.ceres.org (last visited July 30, 2008).
  \item \textsuperscript{268} See American Chemistry, Responsible Care®, http://www.americanchemistry.com/s_responsiblecare/sec.asp?CID=1298&DID=4841 (last visited July 30, 2008).
  \item \textsuperscript{269} Id.
  \item \textsuperscript{270} See Forest Stewardship Council, Homepage, http://www.fscus.org (last visited July 30, 2008).
  \item \textsuperscript{271} Balbus et al., supra note 257, at 70.
\end{itemize}
new scientific research to help identify problems and to set clear goals, collaboration among a broad range of parties, new sources of funding, reliance on social marketing to change behavior by individuals and smaller organizations, and use of a number of innovative management tools are all essential to making progress on rehabilitating impaired waters over the expanse of an estuary or a state. Similarly, the response to urban ozone and particulate matter pollution has benefited from the prospect of stringent federal regulations related to non-attainment, partnerships, often initiated by parties other than government, new management tools such as voluntary diesel engine retrofits, and an engaged public.

The success of brownfields programs depended upon an accommodation of the needs of financiers and developers who were not responsible for the contamination, modest risk taking by government, a different relationship between the development community and government including the willingness to pay for government services that facilitated redevelopment, and bringing private dollars into the cleanup process. The unprecedented pace at which nanotechnologies are emerging requires a similarly multi-faceted approach to governance that includes traditional government regulation, but also includes information disclosure, public dialogue, corporate self-regulation, voluntary industry standards and exposure to legal liability.

Other critical issues of the day such as climate change will also require a diverse approach to governance. GHG emissions come from a variety of sources located in many different countries. While some classes of point sources such as coal-fired power plants are major sources of GHGs, contributing about 40% of all CO₂ emissions in the United States, reducing emissions from just one source or class of sources, or in just a few countries, will not produce the over 70% reduction in GHGs that leading scientists have estimated is needed to prevent the projected climate and accompanying changes from occurring. In fact, households in the United States are responsible for over 30% of CO₂ emissions—about 12.7 trillion tons of CO₂.

IV. Rethinking the Government's Role in Environmental Management

Both the numerous reviews of the environmental regulatory system and the case examples explored above demonstrate that we must rethink environmental governance. In addition to restructuring some aspects of the environmental regulatory system to make it more flexible and performance-oriented, government must improve its capacity to function in at least five other areas:

- Utilizing and participating in partnerships, collaborative efforts and networks;
- Understanding and taking advantage of internal economic drivers of corporate behavior;
- Enabling the public to directly influence environmental decisionmaking;
- Providing information and education that helps build public environmental values; and
- Identifying and mainstreaming innovative environmental management tools.

Although several environmental programs already incorporate many of these elements, no government environmental program has explicitly recognized that all of these competencies are necessary for effective green governance and created a strategic approach to both developing the competencies and deploying them in a coordinated manner.

Unfortunately, we have been in a virtual stalemate at the federal level and in many states on how to reform our system of environmental governance for the last decade. The country can no longer afford deadlock. Small, behind-the-scenes, sporadic attempts at reform are not going to clean up Chesapeake Bay or resolve urban ozone issues. Nor will they be sufficient to deal with the rapidly growing nanotechnology industry or to tackle climate change. Solving these problems will require a societywide effort and a new conception of the role of government. In this new role, government will directly control polluting activity through its regulatory system and influence a wide range of other behavior by recognizing the influence of economics and values on environmental outcomes and leveraging the influences to achieve desired environmental outcomes through a broad network of organizations, activities, and sources of funding.

The need to leverage economic and values-based motivations for environmental improvement as part of a governance system that also relies on a reconceived regulatory approach fundamentally alters the role of government in environmental protection. Robert Kliigard and Paul Light observe:

The circumstances of the market state will transform the role of government. The government of the territorial state was a doer; students of public administration and, later, public policymakers learned that government’s choice was “make, buy, or regulate.” For tomorrow’s public managers, the choice will be “cajole, incentivize, or facilitate”—a very different task (one perhaps rendered in puncher prose as “carrots, sticks, and sermons”). . . .

Similarly, Chertow and Esty noted that

[one of the central challenges for environmental policymakers is to keep pace with the important elements of institutional realignment that are occurring in society. Notably, the role of government is narrowing, the private sector’s responsibilities are broadening, and nongovernmental organizations, from think tanks to activist groups, are increasingly important policy actors. The corporate world is not monolithic with regard to environmental performance. Some companies take environmental stewardship very seriously and are among the most progressive forces for environmental progress in the world. Other companies continue to pollute with abandon and to seize public resources (water, air, land) as though they were free for the taking. If the next generation of environmental policies is to be successful, separating the leaders from the laggards in the business world will be essential. With limited resources available, governments must target their enforcement activities on those whose performance is not up to par.]


A. The Role of Regulation

The role of regulation is discussed throughout this Article. Regulation has been an essential element of all of the case examples. In some cases it is needed to directly control polluting activities. In others, regulation provides the context in which many of the partnerships function. In still other cases, the public participation provisions of regulatory programs are the doors through which the public enters the environmental debate. And, regulation is a key stimulus of corporate responsibility and the starting point for innovation.

In some areas, such as the control of diffuse-source pollution, more regulation is needed. For example, Wisconsin developed an imaginative way of limiting agricultural runoff by using a soil erosion performance standard that includes cost-share incentives for existing activities but is purely regulatory for new activities. Further, in contrast to the voluntary bus diesel emission reduction program in Minnesota, the California Air Resources Board is planning to regulate emissions from already in use heavy-duty diesel engines.

Enforcement also remains essential. The experience with EPA’s new source review program over the last decade is emblematic of the importance of enforcement. For decades, industrial sources had skirted the CAA requirement to upgrade air emission sources to install the best available control technology at the time an emission source is being upgraded even though the operators had made significant modifications to their facilities, resulting in excess emissions counted in the tens of thousands of tons. A sustained enforcement effort by both EPA and NGOs through the citizen suit provisions of the CAA has been required to ensure the facilities are outfitted with the appropriate control equipment. Similarly, government and NGO enforcement has been essential in making progress in dealing with a range of water pollution issues involving combined sewer overflow, stormwater management, and large animal feeding operations.

Informational regulation will also likely need to play a bigger role in the future. David Case defines informational regulation as “government mandated public disclosure of information on the environmental performance of regulated entities” for the purpose of enlisting the “aid of nongovernmental forces, particularly economic markets and public opinion, to either complement or substitute for traditional regulatory strategies of government standard setting and enforcement.” For example information disclosure is likely to be a critical element in assuring proper development of nanotechnologies.

And, as the critiques reviewed earlier discussed in detail, regulation will also have to be more flexible. It must be able to accommodate rapidly changing industrial processes and rapidly emerging industries. It must differentiate among the best and worst performers so that government resources are allocated to higher priority problems and so that companies are given additional incentives to excel. It must rely more on performance standards than technology standards in order to stimulate innovation.

As important as regulation is, it is also essential for government agencies to fully develop other mechanisms that are able to play a major role in driving environmental improvement in the context of complex ecosystem problem solving.

B. Utilizing Partnerships, Collaboration, and Networks

One of the clear lessons from the critiques and case examples is that solving environmental problems today requires an extensive network of organizations and individuals and that government has an important role to play, although not always the lead role to play in organizing, supporting, and utilizing these networks. Networks express themselves in a variety of ways, sometimes in formal partnerships, other times in collaborations among several parties, and at still other times through a broader set of organizations that enable environmental service delivery. Stephen Goldsmith and William Egggers observed that

[a complicated world, where individuals face highly complex, individualized problems, necessitates a new approach to delivering public services but also provides the necessary tools for the solution. Networked approaches produce both abundant opportunities for substantial improvements in public services and serious management challenges.

The Chesapeake Bay program involves hundreds of organizations functioning in partnerships, through collaborations and as part of several networks. The Minnesota Clean Water Legacy Program and CAM relied on new forms of collaboration and stakeholder involvement. The brownfields programs have succeeded because they involve new forms of collaboration between government, developers, bankers and NGOs. These collaborative interactions are critical in building the political support for new programs, for finding the funding to support new programs, and for providing the field support to execute very large programs.

The question can no longer be whether we should partner, collaborate or rely on networks to help deliver environmental services, but how can partnering, collaboration, and networks work most effectively for all participants. Don Kettle observed that

[] these next-generation problems stretch the EPA far beyond its traditional ways of doing business into complex new partnerships—with other nations, state and local governments, private companies, and citizens. They pose daunting technology—and political—challenges. Most important, they focus as much on governance as management. They require the EPA to chart new relationships with those who share responsibility for environmental quality. Increasingly, that means building partnerships with everyone involved.
Partnering, collaboration, and environmental service delivery networks do not operate in a vacuum. The regulatory system is an essential element of successful collaborations in getting the attention of potential partners, bringing them to the table, and maintaining their focus on reaching important ecosystem restoration goals. For example, the collaborative efforts to restore the Chesapeake Bay have been significant in part by the designation of the Chesapeake Bay as an impaired water, the TMDL lawsuit against Virginia and the resulting implementation deadline of 2010, and the implementation of MS4 storm-water requirements.282

EPA’s regulatory role has also been important in ensuring the cleanup goals track with the TMDL requirements. When states completed the initial allocation of pollutant reductions required for tributary strategies to meet the 2010 Chesapeake Bay restoration goal, the total reductions fell well short of the reduction numbers required to meet the goal. EPA was able to step in and allocate the remaining reductions to the states based on the formula that the Agency had helped develop through its work on the science related to nutrient reduction. Finally, EPA’s point source regulatory program has allowed the Agency and the states to require wastewater treatment plants to meet more stringent effluent limits in the Bay region.

Regulatory authority is an essential backdrop for many of the other collaborations examined in this article. The Minnesota legislature, in adopting the Clean Water Legacy Act to deal with impaired waters, noted that the purpose of the Act is to “protect, restore, and preserve the quality of Minnesota’s surface waters by providing authority, direction, and resources to achieve and maintain water quality standards for surface waters as required by §303(d) of the CWA, and applicable federal regulations.”283 Accomplishment of this goal “will require long-term commitment and cooperation by all state and local agencies, and other public and private organizations and individuals, with responsibility and authority for water management, planning and protection.”284 The Great Lakes Collaboration operates against the zero-discharge goal for persistent, bio-accumulative toxins and the impaired waters requirements, and the Chamber and the Minnesota Center for Environmental Advocacy launched CAM to deal with the potential that the Twin Cities would become an ozone non-attainment area without prompt voluntary action.

The Chesapeake Bay restoration effort also points out another important role for government, especially in EPA collaborative efforts: providing the scientific foundation and other information that facilitates agreement in collaborative processes. Over a period of several years, EPA provided the support needed to understand the nature of the nutrient impairment on the Chesapeake Bay, identify the sources of the impairment, allocate nutrient loads among the Chesapeake Bay tributaries, and facilitate effluent trading by creating nonpoint source nutrient removal efficiencies for agricultural best management practices. Similarly, the ability of EPA and the Minnesota Pollution Control Agency to model ozone pollution for the Twin Cities was an essential element in the Clean Air Minnesota collaboration.

Partnerships and collaboration have become one of the key tools for environmental management that EPA will use over the next several years. At least in the context of nonpoint pollution from agriculture, airborne deposition, and land use where the solutions require a broad network of players, collaboration appears to be essential to the effective delivery of environmental services. One commentator noted this need and explained that collaboration is “a pattern of governance in which lines between public and private are blurred as the boundaries between them become fluid and permeable.”285 In collaborative efforts:

- Government acts less on other actors in a hierarchical relationship as it does with them in a more collaborative and communicative way; governing consists less of the state exerting control over others in society and more of an interaction among them. There is more shared responsibility and trust. The process of governing is seen as “the creation of learning processes within the interested actors or society in general.”286

A significant portion of the government’s work will continue to focus on specific facilities under specific media programs where collaboration may at times be useful but is not essential. The challenge for the agencies, though, as they increasingly deal with large-scale problem solving is to find ways to shift resources or develop new resources needed to support these major collaborative efforts. Agencies must also develop a work force that understands and is capable of effectively participating in collaborative problem solving efforts.

To more fully integrate partnering collaboration and networks into environmental governance systems, NAPA has recommended that EPA:

- Clearly identify the circumstances in which EPA must function as a “partnering” agency in order to meet national environmental goals, and widely communicate those circumstances both within and outside of the Agency.
- Explicitly reaffirm the role that both direct regulation and indirect leveraging of regulatory authority must play in meeting national environmental goals, and then widely communicate that role both within and outside of the Agency.
- Develop a strategy, based on experience from the Chesapeake Bay Program and other programs that involve a significant role for partnering in both regulatory and nonregulatory programs, showing specifically how EPA can simultaneously function in both a regulatory mode and clearly perceived nonregulatory mode.
- Develop skills within EPA, and among its partners, for organizing, empowering, and leading networks of partners.
- Continue the Agency’s efforts to more closely coordinate its work with other federal agencies, including those that function in a less regulatory mode.

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284. Id. §114D.10, subd. 2.
285. Fiorino, supra note 2, at 19.
286. Id. at 20.
• Build on the Agency’s work on Cooperative Conservation and collaborative decisionmaking to expand understanding of the value of collaboration in achieving environmental results, especially where the environmental problems involve diffuse sources of pollution and where regulatory authority is limited.

• Work with states to support partnering efforts where the efforts are helpful in solving important environmental problems.

• Incorporate the Academy’s “Principles of Effective Consultation” and “Principles for Federal Managers of Community-Based Programs” into the EPA’s partnering policies, communication strategies, interagency and intergovernmental coordination process, and training programs.287

NAPA’s work has highlighted both the difficulty and the importance of making partnering and collaboration an integral part of environmental governance. NAPA points out that EPA’s primary historic mission to regulate pollution has resulted in an internal culture that emphasizes the Agency’s regulatory and enforcement roles above its other missions. This dominant culture is reflected in how EPA’s principal programs are delegated to and implemented by the states, and how regulated entities perceive the Agency.

The Academy Panel’s current research and findings demonstrate two important facts related to addressing impaired waters, and they likely apply to many other environmental cleanup programs as well. First, the regulatory authority under the Clean Water Act and EPA’s use of that authority—both directly in permitting and indirectly through approaches such as the TMDL program—is essential to making progress toward clean and safe waters. Second, partnering with other federal agencies, states, local governments, NGOs and regulated entities is also essential in making progress toward clean and safe waters. These facts require EPA to continue its efforts to build programs and a culture that allow it to function effectively as both a regulatory agency and a partnering agency, and to be clearly perceived as functioning in both ways.288

It will not be easy for EPA, or for state environmental agencies, to function both as serious regulatory agencies and at the same time function as, and be perceived as capable of functioning as a reliable partner in collaborative problem solving. The case examples indicate that this dual role is possible and the nature of the environmental problems confronting the country will require even more effort on the collaborative side of the equation in the future.

C. Understanding and Taking Advantage of Internal Economic Motivations Driving Corporate Environmental Behavior

Government controls the regulatory system, and is able to directly influence some of the economics that affect corporate environmental decisionmaking through regulatory pro-

287. NAPA, supra note 48, at 163; see also NAPA, RURAL TRANSPORTATION CONSULTATION PROCESSES 59-60 (2000); NAPA, PRINCIPLES FOR FEDERAL MANAGERS OF COMMUNITY-BASED PROGRAMS (1997).

288. NAPA, supra note 48, at 164 (emphasis added).

grams. Governments now also use a variety of economic instruments such as taxes, fees, subsidies, trading systems, and even liability regimes to influence corporate environmental behavior. These economic drivers have an important impact on some sectors of the economy and some issues, but they are not the only economic factors that can encourage desirable environmental performance.

Government increasingly must take into account economic drivers other than those directly controlled by government. These internal corporate economic drivers include reputation, customer desires, insurance availability, license to operate, investor preferences, lender concerns, SEC reporting requirements, government and public relations, access to markets, product differentiation, green procurement standards, industry codes of conduct, international environmental standards such as International Organization for Standardization (ISO) 14000, supply chain requirements, employee morale and recruiting, and operational efficiency. All of these factors have economic implications for companies that may be affected by environmental performance. While government does not control these economic motivators, it may be able to exercise some influence over them, and can certainly take them into account in designing governance systems and setting priorities.

As Marc Allen Eisner pointed out:

Future gains in environmental quality may be impossible without a fundamental reconsideration of regulatory design. This reconsideration must take the form of incorporating advances in corporate self-regulation, associational regulation, and standards into the regulatory system and thinking creatively about how public policies can be used to reinforce incentives or compensate for their absence.289

Companies increasingly see the advantages of environmentalism from the perspective of their bottom line. Research has suggested a positive correlation between corporate environmental responsibility and financial performance.290 There are at least five reasons a company might voluntarily regulate its environmental practices to gain a competitive advantage:

1. Shrinking waste output and production inefficiencies can reduce environmental impacts and overall costs, and increase competitiveness.

2. Environmentally responsible companies attract and retain a higher quality work force and increased worker satisfaction leads to increased productivity.

3. Environmentally responsible companies have a better reputation in the community, which can lead to more brand loyalty. These companies also have a decreased risk of being targeted by environmental activists, which can tarnish the brand reputation.

4. Environmental responsibility reduces the risk of being exposed to risks like new regulations, pressure from investors to change policies, and increasing business costs.


5. Environmentalism may provide access to or create a completely new market with the potential for significant revenue growth.291

In short, "being more responsible may help corporations outcompete rivals by staying ahead of tightening regulations, reducing usage of increasingly costly inputs, and attracting investment dollars from concerned consumers."292

Other researchers agree that a company can gain a serious advantage when they start taking the environment into consideration.293 In their four years of research, Esty and Andrew Winston found that companies who are successfully and profitably implementing environmental initiatives understand the interface between environmentalism and business.294 These companies started out implementing environmental management plans because they had to, but now see business opportunities in going beyond compliance.295

They have "evolved to the point where environmental management is second nature and their focus is now on mining the gold in environmental strategy."296 This is in stark contrast to companies that "have not evolved in their thinking since the 1970s . . . and are still grousing about legislation and complying with it grudgingly."297

A second factor in the evolution some companies have undergone is pressure from stakeholders, although the decision to implement environmental initiatives is ultimately linked to the bottom-line. The growing push from stakeholders has caused companies to consider building their reputation for corporate responsibility. In doing research for the book, Esty and Winston were surprised at how often executives said the reason for launching an environmental initiative was because it was the "right thing to do."298 However, building a good reputation is not just the right thing to do, it is also a point of competitive advantage because "doing the right thing attracts the best people, enhances brand value, and builds trust with customers and other stakeholders."299

Esty and Winston conclude: "The logic of corporate environmental stewardship need not stem from a personal belief that caring for the natural world is the right thing to do. If critical stakeholders believe the environment matters, then it’s the right thing to do for your business."300

Stakeholder pressure can be an important source of motivation to adopt environmentally friendly policies. An increasing number of stakeholders put pressure on companies to pay attention to these issues. Aside from the government and other regulators, the public, NGOs, customers, and employees have increasingly called for action.301 Perhaps the most important new set of stakeholders are banks and insurance companies, which may require environmental assessments for major loans and give lower lending rates to companies with carefully constructed environmental management plans.302

Community pressure is also an important force to be reckoned with. In their research on the pulp and paper industry, Neil Gunningham and colleagues found firms were motivated to go beyond compliance because of pressures from the "social license."303 Firms are so motivated because the social license can be enforced in very real ways. It can be enforced by an enhancement or destruction of the firm’s reputation, by putting pressure on regulators to more vigilantly enforcing existing regulations, by the filing of citizen suits, by lobbying for tighter regulations, and by market pressures such as boycotts.304 The authors found that pulp and paper mill firms were generally highly motivated to stay ahead of environmental regulations so that they could remain in the public’s good graces.305

Another distinct benefit and competitive advantage to businesses that go beyond compliance is such a move could gain them "a seat at the table when regulations are designed."306 Companies that foresee the business opportunities to be gained in influencing carbon-emissions regulations stand to benefit from becoming "green" now so that they can be seen as leaders and potentially help shape regulatory policy.307

The third variable in determining whether a company will be motivated to go beyond compliance is the attitude of the environmental manager. In a study of 14 pulp and paper manufacturing mills in Australia, British Columbia, Canada, New Zealand, and the states of Georgia and Washington, the researchers were focused on trying to understand the reasons for the wide variations in environmental performance.308 One of the interesting observations of their work is "the influence of social pressures on environmental performance depends on an 'intervening variable'—managerial attitudes."309 In fact, in their analysis, "environmental management style was a much more powerful predictor of mill-level environmental performance than regulatory regime or corporate size and earnings."310

The factors that motivate large firms to go beyond compliance may not, however, have the same impact on smaller businesses. David Williamson and Gary Lynch-Wood found that the social license does not inspire small firms to go beyond compliance because the main motivations of the social license, stakeholder pressure and reputation, do not

291. Id. at 574-75. General Electric provices the best example of this last reason. It launched "Ecomagination," which among other things includes putting new green products on the market that are expected to generate $20 billion in revenues by 2010. Id.

292. Id. at 576.

293. DANIEL C. ESTY & ANDREW S. WINSTON, GREEN TO GOLD: HOW SMART COMPANIES USE ENVIRONMENTAL STRATEGY TO INNOVATE, CREATE VALUE, AND BUILD COMPETITIVE ADVANTAGE (2006).

294. Id. at 21.

295. Id.

296. Id. at 19.

297. Id.

298. Id. at 13-14.

299. Id. at 14.

300. Id.

301. ESTY & WINSTON, supra note 293, at 9.

302. Id. at 9, 11; see also Assadianour, supra note 290, at 575.


304. Id. at 319-20.

305. Id.


307. Id.


309. Id.

310. Id. at 73.
affect them in the same way they affect large firms and these factors therefore do not produce a response from them. The authors identify five factors that influence a firm’s environmental behavior: (1) the environmental impact of the firm’s products and processes; (2) customer power; (3) customer interest; (4) corporate/brand visibility; and (5) community pressure. They found that two or more factors must have a “high pull rating” before a firm would be motivated to go beyond compliance. These factors often are not significant enough to drive the behavior of small firms. Thus, it is important for government, in looking at the factors that motivate corporate behavior, to be thoughtful about whether particular companies or particular industries are more or less likely to be motivated to perform beyond what the law requires.

The case examples highlight several economic factors that have driven companies to perform beyond the minimum required by law. For the Chesapeake Bay, reputation, government relations, avoiding mandatory regulations, and customer pressure driven by social marketing were among the factors involved. For the Minnesota Clean Water Legacy Act, having a direct voice in the outcome of the legislation, shifting the focus of regulatory programs away from industrial facilities and the economic value of tourism all seemed to play a role. For CAM, avoiding the cost of non-attainment regulations was a prime motivator for businesses, along with the reputation of some of the major industrial facilities and the ability to focus more attention on diverse sources. In the case of the brownfields programs, the key factors for business investment were making risk more quantifiable to facilitate investment decisions and developing an approval process that could accommodate the timeframe of typical development deals.

In order to achieve optimum results with the limited resources available to them, government agencies must continue to develop their understanding of how these internal economic factors affect corporate environmental decision-making and take the factors into account in designing management systems and setting priorities.

D. Providing Information and Education to Facilitate the Development of Public Values

Whether viewed in terms of individual responsibility or ethics or stewardship, values must play a growing role in environmental governance. Aldo Leopold’s views have perhaps never been more relevant than they are today when we are faced with regional crises such as the deterioration of major estuaries, and international crises such as climate change. Leopold observed that

\[ \text{[w]e abuse the land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the aesthetic harvest it is capable, under science, of contributing to culture. That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known but latterly often forgotten.} \]

In a similar vein, the Aspen Institute in its work on resource stewardship observed that

[continued prosperity depends on our ability to protect natural heritage and learn to use it in ways that do not diminish it. Stewardship is at the core of this obligation. It calls upon everyone in society to assume responsibility for protecting the integrity of natural resources and ecosystems and, in so doing, safeguarding the interests of future generations. Without personal and collective commitment, without an ethic based on acceptance of personal responsibility, efforts to sustain natural resources protection and environmental quality cannot succeed.]

Similarly, the PCSD: “Stewardship is an essential concept that helps define appropriate human interaction with the natural world.”

The question for government is what, if any, role could and should it have in value formation. Given that individual behavior is an inextricable element of many of our most important environmental challenges and the fact that we must increasingly rely on self-motivated behavior by organizations that are, after all, led by individuals, it is essential to seriously examine this question.

The most obvious role that government can play in value formation is providing more and better information to the public. By better understanding the nature of environmental problems, the cause of the problems, and what can be done to solve the problems, new public values can be created or existing public values strengthened. Government is statutorily obliged to provide a wide range of environmental information under both substantive environmental law and government data practices legislation. Government, however, has significant freedom to go beyond the minimum requirements of statutes to provide additional information to the public that may assist with value formation. For example, EPA provides the public with information on a wide range of environmental issues such as wetlands, climate change, ground-level ozone, smart growth, and others. Providing information is not a particularly controversial idea. However, providing information with a clear purpose to promote value formation has been more controversial.


The future of environmental law will involve the translation of the scientific principles of ecology and the ethical teaching of environmental ethics into positive law. As this positive law is applied to private land, the translation will necessarily involve an adjustment of the expectation of private landowners. This adjustment may be relatively insignificant as applied in many cases, but in theory, is nonetheless profound.


316. PCSD, supra note 22, at 109.


over the years within EPA and other environmental agencies. In 1981, the Reagan Administration eliminated the Office of Environmental Education that had been established in 1970 in the Department of Health, Education, and Welfare. 321

But, governments have often been involved in large-scale public education campaigns. Among the many examples are Lady Bird Johnson’s Beautify America efforts,322 the U.S. Forest Service’s: “You can prevent forest fires” campaigns,323 Drug Abuse Resistance Education at the state and local level,324 and sexual abstinence initiatives such as § 510 Social Security Act325 that specifies, among other things, that a program must have, “as its exclusive purpose, teaching the social, psychological, and health gains to be realized by abstaining from sexual activity...”326

The Dutch government in its National Environmental Policy Plan recognized the importance of public education and explicitly incorporated it as a strategic element of their plan. The country’s Future Environmental Agenda embraces a public education campaign as central to achieving its environmental objectives.327

Public education efforts, including social marketing efforts such as the: “Save the crabs, then eat them” campaign328 supported by EPA and many others bay organizations, are playing an increasingly important role in Chesapeake Bay restoration.329 A public education campaign was essential to producing the legislative consensus that resulted in overwhelming bi-partisan support for the Minnesota Clean Water Legacy Act and is a central strategy in CAM’s ozone reduction strategy. Building societal values that support energy efficiency, conservation, and a lower carbon economy is likely to be critical in efforts to deal with climate change. These examples point out the important role of values in driving environmentally desirable conduct and the strategic importance for government in supporting values formulation through information, education and social marketing campaigns.

With diffuse sources of pollution a critical element of many of our major environmental problems, societal values will be central to solving these problems. Government agencies cannot avoid considering how they should address the question of values if they are to succeed in achieving their environmental goals.

E. Enabling the Public to Influence Environmental Decisionmaking Directly

Governments have been rethinking the way they involve the public in environmental decisionmaking for some time. The challenge for government is to increasingly make public engagement a part of a strategic approach to green governance that helps produce better environmental results. To do this, they must view public engagement not simply as a method of complying with legal requirements in environmental laws and under administrative procedures acts but as a mechanism for creating pressure on sources of pollution to improve their conduct.

EPA’s 2003 Public Involvement Policy331 is an important advance in engaging the public in a more substantive way in environmental decision-making. The 2003 Policy notes that “[t]o achieve [EPA’s] mission, EPA needs to continue to integrate, in a meaningful way, the knowledge and opinions of others into its decisionmaking processes. Effective public involvement can both improve the content of the Agency’s decisions and enhance the deliberative process.”332 While significant progress has been made in expanding public involvement, the idea still meets with resistance from some agencies since it departs from the classic model in which government personnel are seen as the experts who are in the best position to make decisions about what best serves the public interest. Further, public engagement is often viewed relatively narrowly as the opportunity to comment on agency decisions rather than more broadly as an opportunity to engage the public to directly influence the conduct of sources of pollution.

Public engagement can have a significant impact on environmental outcomes by, among other things:

- Creating pressure on a project proposer to produce more information about the environmental impacts of a project;
- Generating information about a project based on local knowledge and expertise that may result in modifications of a project or improved operation;
- Driving modifications in a project to address environmental concerns that may not be subject to direct regulation such as wetlands preservation, habitat protection, noise, traffic, or hours of operation;
- Creating ongoing consultative relationships between members of the public and the facility proposer;
- Pushing government agencies to more carefully consider aspects of a proposed permit that may not be obvious on the face of a permit application including environmental justice concerns;
- Making a regulatory decision more acceptable to a community leading to fewer operational issues and facilitating future modifications or expansions; and

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325. 42 U.S.C. §710.
326. Id. §710(b)(2)(A).
330. Parts of the discussion on public engagement are derived from LeRoy Paddock, Environmental Accountability and Public Involvement, 21 FASE ENVTL. L. REV. 243 (2004), reprinted by permission.
332. Id. at 1.
• Raising issues about past oversight of a facility owned by a project proposer that may drive improved compliance.333

Unfortunately, the principal public participation methods historically used by government agencies—public hearings, public meetings, and notice-and-comment rulemaking procedures—frequently do not serve well as methods for true public engagement in government decisionmaking. They do not create conditions necessary for effective, or "authentic"334 public participation. King and others found the following:

Although there is theoretical and practical recognition that the public must be more involved in public decisions, many administrators are, at best, ambivalent about public involvement or, at worst, they find it problematic. As a result, although many public administrators view close relationships with citizens as both necessary and desirable, most of them do not actively seek public involvement. If they do seek it, they do not use public input in making administrative decisions (as indicated by a 1989 study conducted by the Kettering Foundation). These administrators believe that greater citizen participation creates delays and increases red tape.335

Citizens are increasingly reluctant to defer to expert administrators.336 Instead, as part of a broader movement toward popular democracy, citizens increasingly want earlier access to the decisionmaking process, more opportunities to be heard and to bring local knowledge to the table, and a clearer role in decisionmaking.337 This is a salutary trend and should be embraced by government as another strategic tool in pressuring sources of pollution to improve their performance.

Dewitt John observed:

[T]op-down regulation works best for large, clearly identifiable sources of pollution, like smokestacks, water treatment plants, and toxic waste dumps, rather than dispersed, small scale sources like individual homes. The command-and-control model is more difficult to implement when there are large numbers of polluters and when it is difficult to monitor what each polluter contributes to an environmental problem. It is simply too difficult for regulators to keep track of so many sources. As one Iowa put it: "It may take an occupying army to regulate the 100,000 farmers in our state."338

An informed and involved public, however, could be part of an occupying army of concerned citizens.


334. "Authentic" public participation "implies more than finding the right tools and techniques for increasing public involvement in public decisions," Cheryl Simrell King et al., The Question of Participation: Toward Authentic Public Participation in Public Administration, 58 Pub. Admin. Rev. 317, 317 (1998). Rather it is participation that "works for all parties and stimulates interest and investment in both administrators and citizens." Id.

335. Id. at 319.


337. See Beierle & Cayford, supra note 333, at 4; see also Paul Slovic, Perceived Risk, Trust, and Democracy, 13 Risk Analysis 675, 680 (1993).


To more fully integrate public involvement as a strategic management tool and to enable the public to directly influence environmental decisionmaking government agencies need to do the following:

1. Recognize the limitations of the traditional public hearing, public meeting, and notice-and-comment procedures, routinely provide notice of a proposed project to the public as soon as a government agency has sufficient information to clearly define the nature and extent of the proposed project and consider adopting public participation policies that are similar to EPA’s 2003 Public Involvement Policy.

2. Encourage project proposers to notify affected communities about proposed projects even before the projects are submitted to the government agency for review and holding preliminary discussions with the community to understand their concerns about the project.339

3. Set aside sufficient resources to assure that adequate information can be made available to the public about proposed projects, agency staff can regularly interact with members of the public, meetings can be held at times and in places that are convenient for the public to attend, third-party neutrals can be used in cases where third parties are needed to facilitate an effective dialogue among the parties, and communities have access to technical expertise when needed.340

4. Provide staff with in-depth training on methods for effectively involving the public, the importance of taking local knowledge into account in their decisions, and how to use their expertise in a way that enables rather than deters public participation.341

5. Develop public participation decision trees for their staff that allow the staff to rapidly analyze which public participation technique would likely be most effective in different situations.342

6. Expand the use of collaborative decisionmaking processes.

7. Make information related to a proposed project, including historical information about related facilities and the facility operator, readily available to the public on the Internet or at local institutions such as libraries so that members of the public have the information needed to effectively participate.343

8. Consider establishing ongoing relationships with some communities in which environmental permits are frequently issued or are routinely controversial based on the federal Superfund program’s community liaison model.


340. See NAPA, supra note 48, at 75.

341. See King et al., supra note 334, at 325; see also NAPA, Models for Change: Efforts by Four States to Address Environmental Justice 135 (2002); NAPA, supra note 48, at 75.

342. See NAPA, supra note 48, at 75.

343. See id.
9. Provide training programs for citizens and citizen organizations that help them better understand the government approval processes and how to most effectively participate in the process.

F. Identifying and Mainstreaming Innovative Environmental Management Approaches

Significant innovations have been a critical factor in each of the case studies. For the Chesapeake Bay, the innovations have included new intergovernmental arrangements, the development of tributary strategies, the introduction of low-impact development concepts, the enactment of the Maryland Flush Tax, the use of social marketing campaigns, and many others. In Minnesota, the ground-breaking collaboration among a wide range of interest groups and a public education campaign boosted the impaired waters issue to the top of the political agenda and opened the door for the passage of the Clean Water Legacy Act. Similarly, CAM relied on an unprecedented partnership between an environmental organization and the state Chamber of Commerce, and was facilitated by air quality modeling produced by the Minnesota Pollution Control Agency and a diverse set of new public and private resources and partnerships that is leading to retrofits for most of the state's school bus fleet. In the brownfields context, the willingness to consider the needs of bankers and developers in rehabilitating old industrial property has dramatically changed the landscape for urban redevelopment and has helped address one of the causes of sprawl. For nanotechnology and climate change, it appears clear that the complexity of the issues will require innovative new approaches to governance to avoid or minimize environmental threats.

EPA and many state agencies have innovation offices or programs that have developed important new approaches to environmental management. However, the process of integrating these innovations into line programs has often proven difficult and controversial. EPA's flagship innovation programs of the late 1990s—the Common Sense Initiative and Project XL—have long since died a quiet death.

Perhaps the most significant challenge to innovation is that simply running existing programs use much of the environmental agencies' limited financial and human resources. For many states, most federal funds are directed to support ongoing activities in the air, water and waste programs rather than innovation efforts. Further, long-standing programs with their established constituencies and budgets often resist shifting resources to new, untested programs.

Other problems associated with innovation efforts can be traced to the complexity of environmental legislation and the fact that EPA has no specific innovation authority. Part of the difficulty with Project XL was that EPA had to cobble together legal authority in the form of a site specific rule to grant the flexibility in facility permits that was at the heart of the program. This slowed experimentation and reduced the number and enthusiasm of program participants. While these are all understandable reasons why innovation programs often have to take a backseat to established air, water, and waste programs, this situation is increasingly problematic given the complexity of the problems discussed in this Article.

NGO acceptance of innovation efforts has also been an issue, especially for EPA. NGO concerns have often focused on priorities—asking whether innovative programs are solving important environmental problems or simply accommodating the economic interests of a few well-connected companies—and cost—asking whether these programs, which tend to be resource intensive in their start up phase, divert scarce resources away from important permitting and enforcement activities. These are important but solvable issues. Clearly, innovation should be focused on important problems and innovation programs should be cost-effective compared to other management approaches over the long run. NGOs have also been concerned about innovations being mainstreamed without adequate evaluation. Innovations should be subject to stakeholder-based evaluation before they are mainstreamed to assure that the programs have broad support among all relevant constituencies. EPA has historically not had a widely accepted stakeholder-based innovations evaluation process.

NAPA, in a recent review of EPA, observed that "most of these innovations [initiated by EPA] presently remain small and outside the mainstream of tools and coordinating mechanisms that are used to implement EPA's primary programs." It found that innovation was essential to more effective environmental service delivery, noting:

Innovation programs that can have direct impact on environmental quality should be made readily available more quickly to policymakers, program directors, and implementation organizations. To accelerate innovation, EPA should place more emphasis on the importance of innovation for environmental problem solving, and on enhancing the culture of innovation within the agency.

To accelerate innovation at EPA, NAPA recommended that EPA

- Recognize and value innovation,
- Regularly invest agency resources in innovation,
- Allow promising innovative ideas to be tested for a sufficient period of time to understand the effectiveness of the idea,
- Regularly evaluate, in consultation with key stakeholders, how innovative ideas are contributing to environmental outcomes,
- Aggressively mainstream innovations that have been demonstrated to produce results by incorporating them into the way the Agency operates, by funding them, and by helping to build capacity in implementing agencies to enable effective use of new tools,
- Seek legislative authorization for particularly promising innovations that have wide stakeholder support but that without specific legislative authorization, are unlikely to achieve desired results, and
- Assist development and promotion of model state legislation and model local ordinances needed to enable new implementation tools.
Changes such as those proposed by NAPA at both the federal and state level would significantly enhance the ability of environmental agencies to develop and mainstream innovative approaches to environmental management, a process that is essential to effective green governance.

V. The Road Ahead

Ken Sexton in the book Better Environmental Decisions observed that "the major obstacle to better environmental decisions is not that we lack ideas, but rather that we have difficulty escaping from the old, familiar paradigms that have shaped our programs and policies for more than two decades. . . ." Governments, businesses, and NGOs know the environmental regulatory system's strengths and weaknesses, understand how the system functions, and have invested heavily in managing environmental problems under this system. Thus, is not surprising that moving from a model where regulation plays the dominant role to a model in which regulation is one of several strategic approaches to improved environmental management is more than difficult. But, given the nature of the problems with which we are faced, not to adopt this new model of green governance is accepting failure.

Governments, working with NGOs and businesses, need to employ all of the drivers of environmental behavior—the regulatory system, economics and values—to achieve desired environmental results. The country needs a diverse and flexible regulatory tool box that can help solve environmental problems. It also needs a box of collaboration tools, a box of internal corporate economic tools, a box of public engagement tools, a box of public values tools, and we need inventors who will consistently test out and then replenish our tool boxes with new approaches.

Daniel Fiorino noted that the European literature on social-political governance is asking the question:

How can dynamic, complex, and diverse social-political systems be governed more democratically and effectively? Their answer is to think in terms of entirely new conceptions of governance, owing to the limits of tradi-

tional, hierarchical ideas about governance in a rapidly changing world. For these writers, "the growing complexity, dynamics, and diversity of our societies, as 'caused by social, technological and scientific developments,' puts governing systems under such new challenges that new conceptions of governance are needed."

Social-political governance involves new patterns of interaction among government and others in society. These patterns are not temporary, but are built into the structures and processes of governance. Distinctions between the public (the state, regulatory agencies) and the private (society, markets) are blurred as the boundaries between them become more fluid and permeable. Government acts not on but with nongovernmental and commercial entities. There is a shift from governance as one-way traffic toward two-way traffic if we are to expect people to take on responsibility they must know why, how, they must have information, they must have a role in design and oversight in which "aspects, qualities, problems, and opportunities" of those governing and of those being governed are considered.

Both the critiques and the case examples demonstrate that effective green governance must involve government acting with nongovernmental and commercial entities. This requires a different allocation of resources, new priorities, and new competencies. Ideally, new human and economic resources would be provided to allow agencies to enhance the ability of government to participate in partnerships and collaborations and operate through networks, understand and take advantage of internal corporate economic motivations, provide information and education that builds societal values, enable the public to directly influence public and private environmental decisionmaking, and identify mainstream innovative environmental management approaches, rather than simply diverting the resources from the still critical functions of regulation and enforcement. However, even if new resources are not available, it is essential that environmental agencies at all levels incorporate these other methods of driving environmental behavior into their strategic approaches to environmental management.

Effective green governance requires that we re-craft our approach to environmental management if we are to make significant progress on some of the difficult environmental issues we face today.


349. Fiorino, supra note 1, at 161-62 (internal citations omitted).