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A S U S T A I N A B L E
A M E R I C A



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**Advancing Prosperity, Opportunity,
and a Healthy Environment for the 21st Century**

The President's Council on Sustainable Development

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The federal officials who serve on the Council participated actively in developing the recommendations in this report, but those recommendations do not necessarily reflect Administration policy. The Council will deliver its report to the President for his consideration. He has not yet reviewed or endorsed the recommendations.

CHAPTER 3
ENVIRONMENTAL MANAGEMENT

INTRODUCTION

Sixty years ago, the World's Fair of 1939¹ introduced to its visitors "The World of Tomorrow." The fair's "Futurama" exhibit presented a glimpse of life in the year 1960. Millions of people visited the diorama depicting life in the city of the future, and millions more saw the movie reel made about the exhibit and the vision it presented. In some ways, the sustainable development issues we face today arose out of the nation's pursuit of a modern world "without limits," as reflected in that 1939 vision.

"Advise the President on the next steps in building the new environmental management system of the 21st century..."

—PCSD Charter, April 1997

A lesson from the 1939 World's Fair is that America and the world can benefit from a concrete, positive vision of a sustainable world. To have any effect, this vision must be appealing and meaningful to people — it must represent the kind of world people are willing to build. Today, as we think about the promise of the future, we recognize the need to make changes to the economic, social, and environmental protection practices of today so that future generations will enjoy that promise.

The 1997 charter asks the Council to "advise the President on the next steps in building the new environmental management system of the 21st century."² The "environmental management system" refers to the overall framework of a broader set of institutional and individual influences that effect the environment including, but not limited to, environmental laws and regulations, corporate stewardship, economic and financial systems, and other features of organized society.³ In the greatest sense, this framework⁴ represents all human activities that directly or indirectly affect the environment, extending the opportunities we have to address change while simultaneously protecting the environment.

The 1996 report of the President's Council on Sustainable Development (PCSD)⁵ made a number of recommendations regarding the nation's environmental management framework. These included: accelerating efforts

to evaluate existing regulations and to create opportunities for attaining environmental goals at lower economic costs; creating an alternative performance-based management system; using market incentives as a part of an overall framework; and shifting tax policies and reforming subsidies that encourage environmentally damaging activities.⁶ Building on these recommendations and other recent work (some of which is discussed Appendix B-3),⁷ here we focus on integrating key concepts and recommending next steps for organizing environmental management toward sustainable development.

The next section of this chapter briefly discusses why the system needs to advance and describes how that process has begun. This is followed by a section on Attributes which presents further observations on the vision of a new environmental management framework and its key attributes⁸ (e.g., Improve Performance, Ensure Environmental Stewardship, Involve Communities). Finally, we offer specific recommendations about the next steps in building a new framework to foster sustainable development. These recommendations suggest how and where change can happen, although any new framework would encompass a far greater number of issues, as well as the imperative of the international context.

BUILDING A NEW ENVIRONMENTAL MANAGEMENT FRAMEWORK

The need to improve environmental quality will not be eradicated once a certain threshold or level of protection has been reached. Even as we continuously and persistently strive to enhance our economic well-being, our health, and the quality of our lives, so too must we constantly pursue a goal of improved environmental quality. To this end, we must build an environmental management framework that will, now and in the future, promote clean air, clean water, less stress on fragile resources and natural habitats, and greater resource productivity.

An environmental management framework that fosters sustainable development has a clear and indisputable goal: continuous⁹ environmental improvement that respects the importance of social and economic well-being.

KEY FINDINGS — ENVIRONMENTAL MANAGEMENT

- **Sustainable development requires rethinking the nature, source, and linkage of environmental problems.** The current definitions of environmental pollution, environmental management, and environmental protection are too narrow, in some cases, to permit identification of the true nature of the problems (e.g., cultural, economic, institutional, political) and to recast their potential solutions.
- **Developing and using information on environmental performance and conditions is critical to any environmental management framework and must be incorporated at all levels of decisionmaking.** There is a need to develop, agree upon, and apply common metrics for measuring and reporting environmental performance of products, households, services, firms, facilities, and the economy; and to further develop and use indicators to measure environmental outcomes and monitor ambient environmental conditions.
- **Environmental conditions can and should be improved beyond existing requirements with an environmental management framework that is organized for performance and that differentiates among size, sectors, and performance levels.** To do this, and to align the framework more closely with the economy, environmental managers should employ effective, certifiable environmental management systems, environmental accounting practices, and appropriate market mechanisms that will improve environmental performance.
- **Regional and systems approaches to environmental management and economic development that better align human activity with natural cycles provide multiple benefits.** An environmental management framework should strive to understand the interdependencies between communities, nature, and the economy; implement strategies that respect and use those interdependencies to improve the environment; and preserve and, when possible, restore biodiversity as a necessary part of ecological vitality.
- **An environmental management framework that fosters sustainable development needs to respect and incorporate the value of community and place.** Communities, like organizations, differ in size, ability, sophistication, and understanding of environmental issues; the framework should be sensitive to such differences.
- **The framework should include both traditional tools and new approaches, and promote early action on emerging issues by involving companies, interest groups, government stakeholders, and international partners in constructive dialogues that lead to solutions.** The framework should foster the application of goal-oriented strategies to existing environmental problems that are inadequately addressed by traditional systems or programs (e.g., nonpoint source water pollution and dispersed air sources).

If the new environmental management framework of the 21st century is to drive continuous environmental improvement to accompany continuous economic and social gains, the framework must optimize the positive dynamic interplay between people, markets, information, technology, and the natural world.

Over the past several years, numerous experiments have been undertaken that suggest the shape of a new envi-

The new environmental management framework of the 21st century will drive continuous environmental improvement to accompany continuous economic and social gains.

ronmental management framework conducive to sustainable development.¹⁰ Conventionally, environmental protection has focused on individual waste streams from facilities. "Reinvented," the environmental management framework can emphasize watershed protection, habitat restoration, community-based environmental protection, or brownfield redevelopment.¹¹ These and many other initiatives point the way to an environmental management framework for sustainable development. While none of them individually represents a complete model, they each suggest elements that should characterize of the environmental management framework of the future. Moreover, the combination of these elements would undoubtedly have a multiplying effect, increasing the performance level of each element.

A new environmental management framework will include standard requirements for all regulated activities

“Reinvented,” the environmental management framework can emphasize watershed protection, habitat restoration, community-based environmental protection, or brownfields redevelopment.

with more flexible strategies for those demonstrating strong environmental performance and improvement. Such a framework will tap a combination of voluntary, regulatory and market mechanisms that motivate improved environmental performance, recognize the value of community, and respect a sense of place. The new framework will focus on and encourage more efficient and effective performance levels for environmental management and protection.

This chapter aims to accelerate implementation of a new environmental management framework. The next section presents a vision of sustainable development; the subsequent section presents recommendations that help align and sensitize the current environmental protection system toward sustainability. Together they provide a compass for charting the next steps in building the environmental management framework of the 21st century.

The recommendations presented here are accompanied by corresponding examples to indicate where intervention for sustainable development might occur.¹² These related environmental management activities are used to illustrate the concepts being discussed and are not necessarily intended as an endorsement of any specific program. As with most environmental management reforms, these and other recent initiatives were not explicitly designed to achieve sustainable development goals; many are achieving success, but not always in the integrative way, or to the degree, that sustainable development requires. Finally, in making these recommendations, the Council has not identified what the roles and responsibilities of each sector should be. Rather, these recommendations are presented so that all groups and institutions can take the next step by making the commitment to act, both individually and collaboratively.

ATTRIBUTES OF NEW ENVIRONMENTAL MANAGEMENT FRAMEWORK

One of the most important revelations of the Council in *Sustainable America* was that meaningful and long-term solutions for environmental, economic and social equity problems will require new strategies that redefine the source of problems, create mutual benefit throughout society and the chain of commerce, and achieve multiple goals — environmental, economic, and social — simultaneously. *Sustainable America* promotes the concept that no matter what environmental issue we choose to address, our goal should be to understand the interrelated economic and social aspects of that issue as well. Solutions must therefore address the environmental, economic, and social aspects of issues and problems as they relate to one another.

There are, in fact, economic and social dimensions to almost every environmental issue — and these are frequently interrelated.

The seven characteristics of a new environmental management framework described below, are among the requisite, interrelated components that constitute the Council's further vision of a sustainable development approach to environmental management in the 21st century.¹³

IMPROVE PERFORMANCE

Improve environmental conditions beyond existing requirements and measurably increase resource productivity with performance-focused environmental management.

Environmental management decisions should focus on improving environmental performance, taking into account social and economic impacts. To facilitate this approach, incentives for continually improving performance must be incorporated into environmental management in ways that



Photo: Stephen Delaney, U.S. Environmental Protection Agency.

encourage innovation for performance beyond existing requirements. Equity and economic growth should also be seen as performance-improving goals.

Sustainability requires all organizations to strive beyond existing requirements with innovative, improved, or enhanced processes or pollution prevention techniques. Organizing for improved environmental performance can accelerate progress towards sustainable development and may encourage innovation and development of new approaches for achieving environmental management goals. In pilot programs, this has been done by categorizing regulated entities into separate tiers based on performance. For instance, "Greentrack" describes programs or initiatives designed to reward and support top environmental performers, although incentives are needed to motivate all organizations to perform beyond existing requirements.¹⁴ The value of organizing environmental management toward performance goals also applies to public facilities or other entities that may not be regulated, monitored, or currently expected to create and manage performance goals. A framework that focuses on performance will challenge all sectors to improve productivity and the efficient use of materials and energy.

ENSURE ENVIRONMENTAL - STEWARDSHIP

Producers and consumers share extended responsibility for the environmental effects of making products, their use, and waste streams through a life-cycle approach.

Environmental stewardship is an ethic and practice of responsibility toward the Earth and its natural processes for the life of products, materials, and energy. It suggests that this responsibility is shared variously by all those in the flow of commerce. Environmental stewardship is an essential element of an environmental management framework.¹⁵ Indeed, a shared sense of responsibility towards the natural environment is necessary to achieve the objectives of sustainable development.

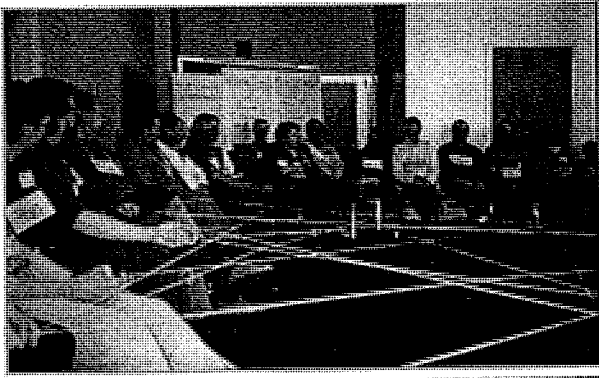
INVOLVE COMMUNITIES

Foster collaboration in problem solving and planning among companies, agencies, and citizens to achieve mutually beneficial communitywide results.

Communities, governments, and businesses can form a powerful degree of consensus, building a culture of inclusive engagement to support sustainable development. The process of making decisions that affect the environment and the community can often be enhanced by sharing information resources, clearly articulating objectives, and collaborating with stakeholders. Information from the community helps expand environmental management decisions to include social and economic issues. Community participation and multistakeholder collaboration processes at the firm level and at all levels of government and public affiliation can also help optimize the efficacy and efficiency of environmental management decisions.

An environmental management framework that is organized for improving performance includes, but is not limited to, the following characteristics:

- Focuses on performance results and progress towards goals;
- Measures, analyzes, and disseminates performance information and other indicators that can help organizations improve environmental performance results;
- Uses environmental management and accounting systems that establish clear and effective performance-based goals and encourage innovative means of achieving current and future environmental requirements; and
- Increases resource productivity (i.e., doing much more with much less) and fosters simultaneous improvements in productivity and the efficient use of materials and energy.



The "Henry's Fork Watershed Initiative" aims to improve water management policies in the river basin. Here, the Henry's Fork Watershed Council conducts a "Web of Life" exercise, intended to demonstrate the interconnection of interests among watershed parties. Participants included representatives from the U.S. Bureau of Reclamation, the Idaho Department of Fish and Game, the Fremont Madison Irrigation District, the Department of Environmental Quality, and members of the local agricultural community. Photo: Center of Excellence for Sustainable Development.

Not all communities are alike or seek the same level or type of involvement. Stakeholders know and can describe problems, priorities, and concerns; but generally, they do not possess the resources to solve technical problems, to help set complex standards, or to involve themselves in time-consuming processes. Decision-making processes should be designed to ensure that they nevertheless have a meaningful role. Orienting and expanding collaboration to a regional scope may increase the likelihood that, to the greatest extent possible, agreement on a sustainable design will be attained without diminishing individual community needs or voiding national goals.

ENGAGE EMPLOYEES

Advance employment opportunities in healthy, safe, and ecologically benign work environments and offer human resource development that satisfies the talent, skill, and desires of employees.

In *Sustainable America*, the Council said that "jobs, productivity, wages, capital and savings, profits, information, knowledge, and education" must grow to achieve a vision of sustainable development.¹⁶ Sustainable development extends to employment both in terms of the level of employment needed for a sustainable society and the quality of employment desired by working people. No economy can survive long without addressing both of these related issues.

Environmental education and training provided as part of job responsibilities have been shown to enhance employee involvement in environmental management and to increase performance levels beyond compliance. A Cornell University study determined that a "serious and organized effort to involve employees in pollution prevention" is more important to program effectiveness than the occasional solicitation of their ideas. "The employee needs to believe that the organization is making a serious effort to involve and empower him or her in matters of pollution prevention."¹⁷ Similarly, energy efficiency and materials management can be optimized when this same level of engagement is reached.

The management framework that fosters sustainable development is one that achieves environmental benefits while simultaneously establishing a positive, rewarding work environment. For this to happen, the future framework needs to recognize the asset and productivity value of

Through communication of the principles of environmental stewardship, it is hoped that the following will be achieved:

- Wider understanding of the need to face the environmental, economic, and social demands of growing population and greater prosperity together (that is, weighing economic development and growth against the carrying capacity of local and global ecosystems).
- Redefinition of commercial activity to focus on the delivery of service and value instead of the delivery of material or products.
- Increased adjustment of public works and institutions, private enterprise, and human activity to operate in ways that understand and complement the natural cycles of the Earth.
- Integration of environmental management with core business strategies so that environmental stewardship has value as a part of doing business.
- Integration of renewable (sustainable) forms of energy into mainstream production processes.

Increased levels of community stakeholder involvement influence decisions through:

- Inclusive collaboration for problem solving and planning to ensure that companies, agencies, and communities can achieve mutually beneficial results;
- Better reporting systems and planning processes that inform and involve the public; and
- Ensuring that environmental benefits are shared and burdens reduced across society without disproportionate impacts.

human capital, as well as the employment levels needed to promote prosperity for greater numbers of people. Economic growth — and therefore sustainable development — cannot occur without a commensurate increase in employment opportunities.

PROVIDE INFORMATION

Use standardized public reporting formats and comparable data sets comprised of metrics, benchmarks, and/or common indicators of environmental performance geared toward generally accepted accounting practices and for generating feedback systems for learning.

An information-rich system, one that generates and disseminates accurate and useful information, has multiple advantages. It motivates those who are being measured to perform better. It allows analysis of past experience to inform future practices.

“Information rich” does not mean, however, that “more is better.” Information is relevant to the environmental management framework to the extent that it is meaningfully incorporated into decision-making processes and adds to the learning that leads to problem solving. Open information policies and practices recognize that disclosure, transparency, and active dissemination of information should be the rule, not the exception, with the goal of increasing access to public information for all segments of society.¹⁸

A new environmental management framework needs high-quality baseline data and metric measurements — information that should be accessible and understandable

Economic growth, and therefore sustainable development, cannot occur without a commensurate increase in employment opportunities.

to the public — and methods for making sustainable decisions. Performance should be monitored against these baselines to measure and verify effectiveness of environmental management and resource productivity. In addition, benchmarks and indicators are needed to conduct comprehensive impact assessments; evaluate the effectiveness of environmental management programs; and measure progress towards sustainable development at the local, state, national, and global levels.

ADOPT INTEGRATED APPROACHES

Employ a systems approach towards environmental management and sustainable development that aligns and maintains a balance of economic and social influences that complement natural cycles or ecological systems.

The fates of the economy, social well-being, and the natural environment are intertwined. For example, the pursuit of eco-efficiency (improvements in environmental performance) should benefit both the natural and social environments. Although it is not possible to take every interdependence into account in every decision, thinking about activities in terms of holistic systems with integrated economic, social, and environmental components can eliminate costly mistakes, unintended consequences, duplication, and gaps. The future framework needs to encompass not only the traditional elements of environmental protection, but also consider nontraditional factors that affect the environment, such as energy efficiency, the dynamics of ever-increasing per capita demand for products and services (e.g., vehicle-miles traveled), and the impacts that reductions in one media might have on another (e.g., multimedia and crossboundary effects).

At the broad resource management level, “systems thinking” means employing approaches that consider the entire ecosystem. The concepts of biodiversity and bioregional or crossboundary effects instruct us that natural systems play a crucial role in building the best environmental



Waste streams can provide raw materials for new products. Saprophyte, LLC uses industrial wood waste as a novel source of materials for modular furniture.

Photo: Saprophyte, LLC, Providence, Rhode Island.



management and economic development approaches. Energy use and natural resource consumption are particularly vulnerable to waste. Management, logistics, and accounting systems should be used not merely for efficiency, but to design better delivery and service patterns that lead to reduced energy and natural resource demand.

At a community level, brownfields redevelopment provides an example of an approach that is integrated and holistic. Previously industrialized land is being redeveloped with a differentiated approach to environmental cleanup costs, although each such brownfields site must address acceptable levels of risk in accordance with planned uses and any unaccounted for pollution. In general, brownfields are a cost-effective option for managing urban sprawl by reducing greenfields development.

At the facility level, systems thinking means treating a facility as a holistic entity, or a "closed loop."¹⁹ Integrated and holistic systems also address the entire life cycle of materials and energy. Together, these concepts suggest "that manufacturing be treated not as a linear activity, but as circular. . . in a closed loop, sustainable system...treating products holistically from cradle-to-cradle. . . to establish pollution prevention and product stewardship as standard business practices."²⁰

At all levels, holistic environmental understanding can be introduced to more closely complement or incorporate natural biological cycles and systems. One of the far-reaching aims of sustainable development is to better align human activities with the natural cycles of the Earth by designing our systems to mimic the cyclical flow of energy and waste within natural ecosystems.

USE ACCOUNTING SYSTEMS AND MARKET MECHANISMS

Recognize the economic value of natural resources as assets and, the business and financial value of environmental management performance; create appropriate incentives that stimulate innovation and the use of market mechanisms in the pursuit of environmental goals.

Ecosystem functions and natural resources have value. So long as these benefits — and the costs associated with externalities such as pollution — go uncounted, environmental management will remain a cost-centered phenomenon, unable to drive sustainable environmental results. This evolution will occur only as the economic and social value of biodiversity, watersheds, wildlife, and other

One of the far-reaching aims of sustainable development is to better align human activities with the natural cycles of the earth...

natural resources are finally realized, and environmental accounting becomes a regular approach within businesses, governments and other organizations.

In a framework that fosters sustainable development, environmental quality and economic vitality can be achieved together. A new environmental management framework should employ economic means that will motivate businesses and individuals to improve environmental quality. The key to linking market rewards with improved environmental performance is the recognition of externalities, or releases into the natural environment, as waste in the economic system.²¹ By contrast, reducing pollution and increasing efficiency often produce financial gains to the economy that are left out of the accounting system.

Managerial accounting practices can be an appropriate tool for integrated environmental management as

Climate Change Opportunities:

Market mechanisms are likely to play a significant role in any strategy to reduce greenhouse gas (GHG) emissions. Some financial institutions are already beginning to reassess and project the value of energy efficiency, renewable energy, technology, and environmental management in future markets. This evaluation is based on the perception that foreign markets and governments are moving to provide incentives — both economic and political — for early reductions in GHGs and other releases that may become marketable. Participation and formal credit for emissions reductions in such market programs can be facilitated by the use of environmental management and accounting systems that include measures to track energy efficiency and GHG reductions.

reflected in firm accounts. The use of managerial accounting systems to track the full costs and benefits related to environmental performance is very important to the firm's identification and implementation of environmentally preferable practices. Although some firms use managerial accounting information in their approach to environmental management, they often fail to link such information to their financial performance (e.g., shareholder value). The reporting of environmental impacts and financial information to external interests, and the inclusion of environmental performance, liabilities, and expenditures in company financial statements, can be powerful drivers for firms to improve their overall value as well as their environmental performance.

Financially related drivers in lending, investment, and insurance increasingly anticipate, value, and reward improved environmental performance. One way for firms to take advantage of good environmental performance internally is to link environmental management with their business strategy and financial performance. For instance, a particularly effective environmental management system may lead to discounts in credit rates or insurance costs, or may return market value to the firm. Understanding and reporting the financial value of this environmental performance allows organizations to better allocate public and private resources.

Separate, but related, to the managerial and financial accounting for environmental management is the emergence of market-related mechanisms. Market-based mechanisms to reduce pollution that are linked directly to an organization's profitability can motivate organizations to improve environmental performance. Market-related mechanisms are not a stand-alone solution. Rather, some can be coupled with the existing regulatory system to achieve the objectives of the new framework. Other types of market-related mechanisms need additional regulations in order to be implemented, or changes in the current reg-

ulatory system to function effectively and efficiently. Ideally, good strategies will work with or enhance the current system, or break down barriers to improvement.

RECOMMENDATIONS

MEASURING PROGRESS AND ACCOUNTABILITY

Developing and using high-quality information on environmental performance and conditions are critical to any management framework and must be incorporated at all levels of decisionmaking. Information by itself, however, does not solve problems. Information-driven applied learning leads to change. Ideal information systems improve the collection, organization, and dissemination of comprehensive, relevant data; reduce duplication and streamline reporting requirements; and inform decision-makers about economic, environmental, and equity impacts to set better goals.²²

Information needs to be sufficiently comprehensive to enrich collaborative decisionmaking and measure real progress. Insular anecdotes, dated reporting materials, and periodic assessments must be replaced by a more comprehensive, credible, and standardized data collection and reporting system that is relevant and valuable to managers, the marketplace, and interested citizens or groups. Environmental performance data should be shared with the public in a timely manner to provide tangible accountability and to foster environmental awareness. Education and information technologies such as the Internet can increase public understanding and access to comprehensive, useful data. However, balanced against the public's right to know and need to understand is the obligation to protect valid confidential business information.

Future opportunities for measuring environmental performance include:

- Reporting relevant, comparable, standardized environmental performance information (both local and global, public and private);
- Providing useful information about ambient environmental quality and conditions;
- Creating synergy with the evolution of international environmental management standards;
- Developing decision-making tools for investors, customers, vendors, regulators, citizens, etc.;
- Tracking energy efficiency, increased resource productivity, land use, and other indices of sustainable development; and
- Enhancing the ability of stakeholders and regulators to assess environmental performance improvements.

Assessing and reporting performance can improve the overall quality of both private and public operations. Better performance can facilitate participation in innovative management strategies that reduce overall costs while providing improved environmental protection. In addition, measuring, accounting, valuing, and disclosing environmental performance to investors, customers, vendors, and the public may enhance the enterprise or business value of some corporations.²³ Further development and implementation of environmental assessment tools and accounting criteria for economic, financial, and regulatory purposes are needed to realize these benefits more broadly.

Recommendation 1

Measure environmental progress.

The public must be confident that progress is being

made to achieve national, state, and local environmental goals. To assess that progress, environmental performance and conditions should be measured at many levels: national, state, discernible regions, community, company, and individual facility (whether industrial, agricultural, public, or commercial). Collection and dissemination of good environmental information linked to established goals may help drive performance improvement and better planning, increase resource productivity, and alleviate stresses on the environment.

Various stakeholders use environmental information in different ways. For policymakers, this information can be integrated into a larger set of indicators for sustainable development.²⁴ Regulators can use environmental performance data to better allocate resources for program management. For the private sector, environmental accounting helps determine the strategic business value of environmental activities, which can be an important factor in business planning and the creation of new markets. Information on pollution trading rates, ambient conditions, and environmental resources can be used by citizen groups and others to set goals and determine priorities for community development and restoration.

Action 1

Develop and apply agreed-upon sustainable development indicators and collect the necessary data for measuring environmental progress at the regional, state, and national levels.

Action 2

Develop, apply, and report on specific indicators for facilities, firms, sectors, communities, and the economy to track increased resource productivity (for services and production, public and private).

The Florida Department of Environmental Protection's **Environmental Performance Measures** program developed sustainability plans that identify key issues and multi-agency strategies to improve environmental conditions within regional ecosystems. This program uses a four-tier system to monitor agency performance. These tiers include Environmental and Public Health Indicators, Behavioral and Cultural Measures, Outputs and Activities, and Resource Efficiency Measures. These four categories are intended to work together, allowing environmental management to be considered at different levels.

Accounting for Sustainable Development (ASD), developed in cooperation with the Society of Management Accountants of Canada to measure sustainability in corporations, is an accounting approach that encompasses the entire cycle of production, also known as full-cost accounting. Currently, the ASD framework is being utilized in the development of some environmental management systems.

Action 3

Invest in information systems for monitoring environmental conditions to assess and report on local and regional impacts and transboundary effects, and to establish priorities.

Action 4

Use accounting practices in the management of environmental performance at the firm level to derive strategic business value.

Action 5

Use financial performance information and analysis to drive institutional decisionmaking toward the profitability of sustainable development.

Recommendation 2

Define common metrics for environmental performance.

Performance metrics and indicators help ensure that the right information is collected to support achievement of environmental goals and to accelerate progress towards them.²⁵ A common set of metrics, measurements, and indicators is needed to meaningfully inform communities, nongovernmental organizations, regulators, and financial analysts interested in the environmental performance of organizations. This set must be consistent, unbiased, and understandable; relevant to the issues being addressed; able to portray trends over long time periods; and capable of communicating the relative risk and comparable progress on various environmental matters (see appendix B-1).

Ideally, a new framework that incorporates metrics and indicators for common performance elements shared by most public and private organizations would be developed first. This reporting system would reflect both site-specific (e.g., facility) and organization-level (e.g., corporatewide) performance. These systems must then evolve to account for sectoral and regional differences, and incorporate similar measures of economic and social well-being.

Action 1

Develop multiple stakeholder agreement on and implement common metrics for measuring environmental performance (using a model of generally accepted accounting principles where appropriate) to:

- Assess progress towards protection of human health and the environment;
- Gauge operational flexibility and performance standards in alternative performance-based management strategies;
- Identify market mechanisms and business values that

The **Global Reporting Initiative**, a multiyear project of the Coalition for Environmentally Responsible Economies, aims to establish - through a global, voluntary, and multistakeholder process - the foundation for standardized corporate sustainability reporting worldwide. The effort is intended to elevate sustainability reporting practices to a level equivalent to, and as routine as, financial reporting in terms of comparability and generally accepted practices. Draft guidelines will be beta tested on roughly two dozen organizations.

help improve the regulatory approach and drive optimal performance; and

- Communicate relevant environmental performance and improvements.

Action 2

Measure environmental performance and report relevant information in a standardized format to foster continual improvement for products, facilities, and firms.

Recommendation 3

Link environmental, economic, and social information.

To balance interests and optimize progress towards sustainable outcomes, environmental performance information must be integrated with social and economic information. Greater strides in sustainable development will occur when businesses are able to capitalize on the financial value of good environmental performance, life-cycle issues are considered in process and product design, and consumers are able to see beyond the material to the value of products. The paramount goal for integrating diverse types and levels of information is to affect the decision-making process in such a way that sustainable development opportunities become more obvious, and therefore logical and desirable.

Action 1

Develop incentives for collection, dissemination, and use of information on the life-cycle of products that focuses on optimizing the use of natural resources (i.e., materials), building energy efficiency, and reducing environmental impacts.

Action 2

Foster extended product responsibility by assigning appropriate levels of care to those who have the greatest capacity for stewardship in the life-cycle of a product.

National Metal Finishing Resource Center is comprehensive environmental compliance, technical assistance and pollution prevention information source available to the metal finishing industry. The Center is an Internet Web Site that casts information in a way that makes it accessible to an entire range of users and establishes convenient and user-friendly delivery mechanisms. It also serves as an information resource and distribution channel for technical assistance programs and has many on-line conferences whereby users can talk to each other about specific compliance issues. Services and products include: an EPA Regulatory Determinations collection pertaining to metal finishing; performance and cost comparisons across technology options; pollution prevention case studies; and vendor information.

The **Digital Earth** concept, although not yet fully operational, is a characterization of the terrestrial natural and cultural environment, referenced in space and time, along with the educational program needed to communicate the possibilities and procedures of using a fully developed imaging system of the Earth. Within the United States, the National Spatial Data Infrastructure established by Executive Order in 1994 provides the basic mechanism for the coordination, access, and distribution of the geospatial data needed to form the Digital Earth. These data can be used in geographic information system applications, which is of increasing interest at the local government level. International or global data sets can extend the geospatial components beyond U.S. borders.

Action 3

Create information resources to focus commercial activity on the delivery of service and value instead of the delivery of material or products.

Strategies that provide incentives for performance improvement should be sensitive to business size and sectoral differences, distinguish between strong and weak performers, and leverage third-party agents when their participation would be feasible and effective.

Action 4

Educate the public about and encourage organizations to operate in ways that recognize and reduce environmental impacts and that complement natural cycles of the Earth.

IMPROVING ENVIRONMENTAL MANAGEMENT AND PERFORMANCE.

The current national environmental protection system has achieved a substantial degree of success by requiring manufacturers to control pollutants; however, it is time to consider implementing new approaches. After decades of

evolving environmental regulation, there is growing variation in the way different organizations perform. Some firms have already internalized the need for environmental stewardship into their business; others are simply focused on compliance. Still other firms need a great deal of assistance before they are able to meet environmental requirements at all. If the nation is to move toward sustainability, progress must come not only from the leaders, but through improvements in the performance of all actors.

Tools such as pollution prevention, design for the environment, extended product stewardship, eco-efficiency, and environmental management systems that include a commitment to continuous improvement enhance environmental performance.²⁶ These "prevention approaches" improve industrial efficiency through better energy and materials management; they can also provide safer places to work and reduce the impacts of pollution on commu-

The **Chemical Industry Compliance Assistance Center** makes available a wealth of detailed information on federal regulations and pollution prevention practices, including plain-English guides, pertinent interpretative memoranda, compliance checklists, fact sheets, and links to technical assistance providers, state/local regulators, and professional and industry organizations. The Center is sponsored by the National Center for Clean Industrial Treatment Technologies, a research consortium dedicated to advancing pollution prevention, along with the Pacific Northwest National Laboratory, the University of Wisconsin's Solid and Hazardous Waste Education Center, and EPA.



The inside of F-16 fuselages are cleaned with a spray of water and liquid soap. Replacing a process that used five tons of ozone-depleting chlorofluorocarbons (CFCs) and volatile organic chemicals annually, the soapy water process is part of a CFC-elimination effort that has saved Lockheed Martin Tactical Aircraft Systems \$8 million in the last five years.
Photo: Pat Corkery, Lockheed Martin.

nities. Organizations that lead the way in research, development, and application of these approaches should be supported and rewarded. In addition, industry leaders and government should encourage adoption of more sustainable practices by the large majority of firms that are not currently high performers.

Regulatory systems need to recognize the different environmental management capabilities, commitments, and performance levels of both private and public entities. Differentiation among regulated entities must be based on their level of commitment to environmental stewardship, environmental management, and actual performance in achieving their environmental objectives. Ambitious national standards must be maintained, along with strong enforcement to ensure compliance with those standards. At the same time, the emphasis of some environmental managers on improving environmental quality and resource productivity — not just complying with standard requirements — needs to be affirmed. The environmental

management framework and regulatory system should offer appropriate incentives to improve organizational environmental performance at all levels. Strategies that provide incentives for performance improvement should be sensitive to business size and sectoral differences, distinguish between strong and weak performers, and leverage third-party agents when their participation would be feasible and effective.

Recommendation 4

Differentiate by sector and size.

The management response of individual companies to regulatory programs depends on factors such as their size, information sources, the level of competition in their sector, and degree to which they sell directly to individual consumers. Regulatory programs should acknowledge these differences and address the various sectors in ways that account for their unique aspects and that will increase environmental performance. For example, regulatory agencies can help smaller businesses or specific sectors comply with targeted rules by providing detailed information about environmentally protective technologies, and by communicating with the businesses through trade associations and suppliers. Regulatory agencies can also help small businesses explore ways to realize economies of scale in environmental protection such as sharing (i.e., aggregating) the costs and use of pollution control equipment or by sharing experts through cooperative contracts with environmental consultants.

Action 1

Implement management programs using environmental performance information to provide the flexibility needed to meet specific requirements of regulated activities in the following ways:

- Tailor programs and provide technical assistance to create an economy of scale among small businesses to improve environmental performance (e.g., agglomeration or clusters).
- Tailor programs to recognize the specific regulatory and

EPA's **Environmental Accounting Project** works to encourage the modification of accounting practices to accept and explicitly account for the environmental cost of all business decisions. This program focuses primarily on managerial accounting practices and those costs internal to the firm, and encourages identification of environmental costs within a facility by product or process. This information can be used by managers to develop more accurate costing and pricing of products and services. It is anticipated that applying environmental management accounting principles will demonstrate the business benefits of environmental stewardship and better performance.

The **Environmental Results Program of the Massachusetts Department of Environmental Protection** is a sector-specific program targeting small businesses that replaces the current state permit system with a mandatory certifying program intended to be a more effective method for improving environmental performance. The state provides all businesses in a specific sector (e.g., drycleaners, photo processors, printers) with detailed workbooks explaining why and how they need to protect the environment in their workplace, and identifying specific required activities. The program also incorporates an aggressive outreach strategy that includes working with the trade associations and translating material into other languages when needed to reach business owners; a requirement that senior business officials certify their company's compliance with environmental requirements; a targeted enforcement effort to assure compliance; and a program evaluation component to monitor the industry compliance rate.

EPA's Common Sense Initiative is a participatory, multistakeholder program that seeks innovative ways to achieve environmental goals for six industry sectors. Under this program, the metal finishing sector recently launched a National Strategic Goals Program to improve the environmental performance of metal finishing facilities. At the national level, the industry committed to achieve a set of specific environmental goals (e.g., by the year 2002, 98 percent metals utilization on products, 50 percent reduction in metals emissions to air and waste, 50 percent reduction in water use). To promote achievement of the goals, a tiered program offers incentives appropriate to four levels of environmental performance, as follows: operational or regulatory flexibility for top firms; compliance assistance for mid-performers, transition assistance for firms that might otherwise abandon contaminated operating sites, and enforcement against chronic noncomplying firms. EPA provides guidance and support to the program, which is being implemented and tailored by participating state and local agencies.

environmental performance issues associated with important industrial sectors (e.g., the U.S. Environmental Protection Agency's [EPA's] Common Sense Initiative for the Metal Finishing Sector).

Recommendation 5

Promote high performance.

Excellence will find its reward in public recognition and the marketplace. Government programs, however, should aim both to help align market rewards with good environmental performance and design program or system changes to reward that achievement. Environmental performance programs should be designed to encourage and provide incentives to companies and organizations that consistently outperform existing environmental requirements and that are committed to continued environmental excellence and improvement. Top performers with the ability and commitment to ensure high levels of environmental protection should be aided and benefited by market rewards, public recognition, and increased operational flexibility.

One way to help motivate companies to pursue excellence in environmental management is to establish programs for alternative regulatory strategies, sometimes referred to as a "greentrack" or "alternative path."²⁷

Participating companies could propose process-specific operational changes and alternative strategies leading to both high environmental performance and increased profitability.²⁸ Businesses that outperform existing environmental requirements and continually improve performance over time would benefit from the economic and administrative certainty of such a program. As a condition, they would be expected to report verified performance information to government and the public.

It is crucial that proposals by a firm under any alternative regulatory strategy result in an overall environmental improvement over what the firm is required to do otherwise. Therefore, such approaches must employ quantifiable environmental performance measures and effective enforcement mechanisms specifically targeted at, among other things, the areas in which the firm has been offered regulatory flexibility to ensure that performance is improving.

Government must be able to verify and enforce this performance at least as reliably as it can under the present system. Similarly, in the case where a firm is receiving regulatory benefits different from those under existing programs, the proposed alternative should confer a recognizable net benefit to society.

Project XL (Excellence and Leadership) attempts to test new ways of producing better environmental results, while achieving greater efficiency for business and increased public participation through active stakeholder processes. The key to Project XL is regulatory flexibility to tailor regulations, policies, guidance, or approaches in a way that benefits project sponsors, while at the same time improving environmental performance. With these efforts, social and community benefits are increasing as the stakeholder process improves and matures. Project XL and other EPA reinvention programs represent cross-cutting attempts to improve and differentiate performance, thus providing important lessons for making systemwide changes in the framework.

Launched in 1995, the **European Eco-Management & Audit Scheme** (EMAS) is a government regulated voluntary environmental management system. EMAS distinguishes itself from ISO 14001, the international environmental management systems standard of the International Organization for Standardization, by virtue of its requirement for a site-specific public environmental statement. This statement must provide information on raw material, water and energy use, pollutant emissions and waste generation, and any other significant environmental effect. Using the financial auditing model, EMAS also provides for third-party verification of both regular site audits and the public statement. These features may add to the scheme's credibility, and can help participating sites focus on continuous improvement of environmental performance and external communication. They also reflect the roots of EMAS as a public policy instrument rather than an internal management tool, which is the focus of ISO 14001. Almost 2,000 sites in Europe have registered to EMAS. The European Union is currently proposing revisions to help make the voluntary initiative a better complement to existing requirements and increase its benefits to participating entities.

Current alternative regulatory programs are in the developmental and experimental stages. Such programs must establish clear goals, guidelines, and performance measures for their success to be replicated more broadly; to maintain the fairness of the system; and to ensure public confidence. These programs must also be designed to address concerns that small businesses may not benefit equally, and that program design and monitoring may demand additional resources from government and stakeholders.²⁹

Action 1

Develop a voluntary program that motivates and rewards high environmental performance and confers a net benefit to society.

Action 2

Define characteristics of good and outstanding environmental performers (e.g., compliance history, modern environmental management systems, continual improvement, pollution prevention, reported results, etc.).

Action 3

Develop incentives for voluntary participation (e.g., operational flexibility, system of rewards/recognition, fast track, preapproval, multimedia, etc.).

Action 4

Provide administrative tools and incentives to motivate middle-tier performers to achieve the standard of excellence set by high performers.

Recommendation 6

Align with the economy.

All environmental management programs need effective methods to assess environmental performance and ensure public confidence in the system. However, information technology allows far more rapid change in production processes and products than was previously possible. More than ever, companies need to be able to change their processes rapidly to maintain economic competitiveness. Government can and should do its best to reallocate, adapt, and adjust its environmental management capabilities to keep pace with expansion and change in the economy - currently, it is a significant challenge to align environmental protection efforts with the economy. In the future, public and private institutions will need to evolve together as economic activity continues to grow and the environmental management framework becomes more complex, flexible, and diverse.

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The number and types of activities that affect the environment change with the economy. By contrast, changes in the environmental management framework (arising from both the public and private sectors) that would improve efficiency and effectiveness are not always in sync with fluctuations in the economy; for example, environmental agency and program resources often lag behind economic improvement. Consequently, the environmental protection system can suffer in its effectiveness or become an unintentional bottleneck, and frustrations grow on all sides.

A new environmental management framework must anticipate change and strive to evolve. Indeed, mechanisms that act to ensure that environmental protection automatically matches changes in the economy are in various stages of development. For some of those systems, a significant infrastructure and an assessment of performance is still needed. Potential mechanisms include market-based programs and charges for some programs; the use of qualified third parties (who are neither the regulated nor the regulator) to document and improve environmental performance; and the adoption of environmental management systems (EMSs), including firms' growing use of the ISO 14001, the international environmental management systems standard of the International Organization for Standardization (ISO). (For more information, see appendix B-2.)

Market Mechanisms. Market-based programs and charges use regular market functions to protect the environment. Under these systems, the cost of pollution is set by the market, and costs to companies are linked directly to their environmental performance. Companies thus have increased incentives to reduce these costs through innovation. The government plays a very different role in this sort of system than it does in most other environmental protection programs. Its primary role is to maintain the integrity of the market, ensuring that companies are actually buying and selling what they report. The government also must ensure overall progress toward environmental

goals. Market mechanisms cannot be successfully applied to all environmental problems; for example, where pollutants are not readily monitored and establishing a baseline for trading or validating reductions is difficult.

Environmental Management Systems. There is widespread and growing use of environmental management systems by organizations domestically and abroad as the inherent benefits of these systems are recognized. The Council believes there is potential in their use in promoting high environmental performance; however, the link to performance improvement has not yet been made. An environmental management system can be a significant tool for sustainable development if the link to verifiable, credible reporting is made and performance improvements demonstrated. Alone, environmental management systems (including properly certified ISO 14001 systems) do not necessarily ensure improved environmental compliance and performance (see appendix B-2). Rather, effective environmental management systems can provide significant structural support for improving performance if coupled with qualitative and quantitative performance commitments and goals. To make such environmental improvements, systems must be in place and producing verifiable performance results.

Third-Party Certification and Auditing. Private sector third-party certification and auditing company services are used by firms to review corporate environmental management activity. These third parties can be used to review permits, certify environmental management systems, audit compliance, or verify environmental performance results and reporting. A commercial industry of highly qualified and competent third-party certifiers and auditors (analogous to financial auditors who certify the accuracy of certain segments of the financial system) could be an important feature of a more diverse environmental management framework. These services could be used by high-performing organizations as part of their alternative regulatory strategies; firms interested in partially outsourcing aspects of their environmental management functions; and, potentially, government agencies to augment their oversight activities.

Currently, the field of third-party certification is in its initial stages of development, and fundamental design and oversight issues must be addressed. Private auditing arrangements can supplement, but do not replace, governmental oversight. However, such an industry could augment government inspection efforts, adapt more quickly to changes in the economy, and help ensure the public's confi-

Environmental Management Systems (EMS) Incentives Project. In 1997, the Oregon state legislature passed “green permits” legislation to encourage regulated facilities to achieve environmental results that are significantly better than otherwise provided by law. The EMS Incentives Project is one approach that Oregon Department of Environmental Quality believes will achieve the environmental results envisioned in the legislation. The project uses a tiered system in which greater environmental performance is rewarded with increasing regulatory benefits. For participating companies, compliance with standards is the baseline level of performance required under the program. Measurable environmental performance goals are established, and public reporting and meaningful stakeholder involvement are expected. The three-tiered system requires demonstrated reductions in targeted environmental impacts; the highest and second highest tiers must demonstrate that the facility is in the top 10 percent and 25 percent, respectively, of industry environmental performance. Incentives include public recognition as an environmental leader, regulatory and operational flexibility, and technical assistance.

dence in the new environmental management framework.

Once developed, an effective third-party system would need to maintain very high standards. That is, it is necessary to ensure that what the recognized third-party certifiers have approved should, in fact, have been approved. Any auditing system (public or private) can fail: auditing standards may prove ambiguous; auditors can be lax, poorly qualified, or incompetent, or may be deliberately misled. Existing financial auditing and accounting systems occasionally fail; a similar failure in an environmental auditing system could have disastrous effects on human health or the environment. Safeguards need to be put in place to prevent such harms where auditing systems fail. For instance, poor-performing auditors should be penalized through disqualification, civil liability, or criminal sanctions.

In systems of this kind, the government’s ability to establish and enforce environmental standards, and ensure the veracity of a limited number of validated certifiers, is essential to environmental protection. Equally essential would be the maintenance of clearly defined auditor qualification standards, which may be based on voluntary consensus standards where practical. Comparable programs should be available to both small and large businesses. Properly designed, such programs should complement and enhance community involvement.

All parties — government, business, and the public — could potentially benefit from the services of a vibrant third-party certification and auditing industry where the participants are qualified and competent. Governments can serve as a catalyst for this by providing guidelines that can be used for accrediting third-party certifiers and auditors under certain conditions; creating voluntary programs that stimu-

late a demand for this new service; and in helping to maintain strict standards for third-party certifiers and auditors. As part of the activity relating to this area, governments should evaluate whether any new programs realize the anticipated environmental protection, flexibility and gains, and resource savings.

Action 1

Environmental management systems (EMSs) of high-performing organizations can and should include mechanisms for successfully ensuring compliance accurately measuring and reporting performance. Systems may vary by size and type of organization, but comprehensive EMSs used by high performing organizations would share the following characteristics:

- A plant-specific EMS, or corporate-level, system implemented at the plant level;
- Accepted corporate environmental principles, policies, and goals;
- Commitment to compliance baselines and continually improved performance;
- Identification and prioritization of environmental aspects and impacts;
- Environmental performance metrics/indicators;
- Sufficient public involvement and public reporting to permit meaningful understanding of facility management, performance, and compliance status;
- Pollution prevention, design-for-the-environment, and life-cycle approaches;
- Supply chain and extended product responsibility efforts;
- Environmental accounting;
- Periodic system evaluation or auditing;

EPA's New England regional office is piloting the **StarTrack program** as a means of achieving better environmental performance through the use of environmental management systems and third-party certification. Companies participating in StarTrack are required to have an established compliance auditing program and demonstrated commitments to compliance, pollution prevention, and continuous improvement of environmental performance. To meet program requirements, companies conduct comprehensive compliance audits and environmental management systems audits. Qualified independent third parties review and certify the audits. Action plans must be developed to address any areas of noncompliance and any areas needing improvement in the environmental management system. Each company prepares and makes publicly available an annual environmental performance report. If successful, this program has the potential to produce improved environmental protection, improved public understanding of companies' environmental performance, and improved efficiency in the use of public and private resources. Moreover, by monitoring and reducing the environmental impacts of performance, flexible operational alternatives can be identified and adverse effects prevented in a more verifiably routine manner.

The **Licensed Site Professional (LSP)** program of the Massachusetts Department of Environmental Protection is an innovative bridging of government and private sector resources. It uses licensed nongovernment professionals to oversee contaminated site cleanups, thereby accomplishing more cleanups than if the state reviewed all sites on its own. Although the state still maintains oversight responsibility at a small number of sites that have been identified as the most serious and/or complex, private LSPs are responsible for approving the key response actions at all other sites, using the redesigned remedial program as their guide. Responsible parties and their LSPs must follow the processes and meet the standards specified by the state, document actions taken, and provide an "opinion" from the LSP stating that the cleanup work complies with state requirements. Thus, those who wish to proceed rapidly with cleanups can do so without delays occasioned by shortages of state staff time. This system has accelerated cleanups statewide without reducing environmental standards.

- Provisions for corrective/preventive action with regard to identified problems; and
- Senior-level responsibility and interdepartmental agreement.

Action 2

Encourage federal and state agencies to develop and test voluntary incentive-based programs involving the use of accredited third-party certifiers and auditors to:

- Certify environmental management systems (including properly implemented ISO 14001s);
- Conduct periodic, verifiable auditing of environmental compliance and performance, and review findings with appropriate agencies; and
- Create and provide public reports of environmental management and performance to allow for meaningful public understanding.

Action 3

Develop performance goals and program incentives for enrollment in the above-described programs. Companies seeking performance review, certification, and audit results in such administrative and regulatory programs must have a history of good compliance and environmental management systems that measure environmental performance and compliance.

Action 4

Conduct a critical review of current programs and policies for the accreditation of third-party certifiers and auditors by a panel of experts from business, the financial community, environmental organizations, federal and state regulators, and community representatives to determine what, if any, additional guidelines and institutional changes are necessary or desirable.

LINKING PLACES AND STRATEGIES

Connections to our community and a sense of place have long contributed to the quality of our lives. In many ways, these values are hard to explain, and their existence is even harder to prove. Nevertheless, the strength and breadth of community bonds, as evidenced by support for local sports teams or allegiance to schools and neighborhoods, demonstrates their importance. People value connecting with others, and this affinity is the wellspring of community. And when they do make these connections — through parent associations at school, churches, and synagogues, or block organizations — they are able to fix problems and make progress in ways that they could not have done individually.

The Council believes that improving environmental quality is everyone's responsibility. Environmental performance and environmental management apply to communities and geographic regions as well as to businesses and industrial sectors. The combined performance of businesses, civic government, community organizations, and public associations can greatly enhance the value and benefits of local citizenship when organized to achieve environ-



The Bronx Community Paper Company, a 100% recycled paper mill, was planned by the Natural Resources Defense Council and designer Maya Lin in collaboration with south Bronx community groups. Constructed on a brownfield, the mill will recycle wastepaper, clean up and reuse sewage water, and produce livable wage jobs in the poorest census tract in New York City.

Photo: Maya Lin and Natural Resources Defense Council

Environmental performance and environmental management apply to communities and geographic regions as well as to businesses and industrial sectors.

mental outcomes that foster sustainable development. Because the actions one group takes have an effect on the others, identifying these linkages also allows community members to recognize that social, economic, and environmental opportunities are often interdependent.

A new environmental management framework that supports sustainability needs to respect and incorporate the value of community and places, while at the same time ensuring that all communities have minimum baseline standards of environmental protection. It should also extend expertise and assistance to places experiencing adverse environmental consequences to find and implement collaborative solutions that reduce those impacts. Strategies that engage the community in monitoring environmental problems and crafting solutions have many advantages. They create a forum for debating tradeoffs that may be necessary; they tap the opinions and expertise of people with diverse views and talents; and they can catalyze cooperative action.

Recommendation 7

Foster a collaborative regional approach to environmental protection.

Generally, environmental management is place-dependent. Air emissions, however, can concentrate in a relatively small area or cross jurisdictional boundaries, depending on the characteristics and size of the airshed and source of the pollution. Similarly, contaminants released to water can be dispersed through a watershed or can concentrate in sediments. Pollutants spilled on land often make their way to the waters within a watershed, and ultimately the ocean, as rains create soil erosion and stormwater runoff, or as the pollutant seeps into groundwater. Since contaminants move from place to place, communities in one place cannot disregard the fact that contaminants travel elsewhere.

Solutions to environmental problems therefore must be place-sensitive, identifying specific problems affecting an air- or watershed, the sources of the problems, and how each

source contributes to them. Solutions can be strengthened by building on the regional nature of some environmental concerns,³⁰ and by tapping the resources and expertise of affected jurisdictions to devise and implement solutions.

Regional, state, and local collaboration are essential in achieving sustainable environmental management, especially in natural resource and land use decisions. Regional- and state-level collaboration can take multiple forms and occur at different points in the same geographic area. For example, a collaboratively conducted “sustainability inventory” — an assessment of environmental impacts affecting an area or region and of the availability of resources needed to make progress — can provide a context for individual initiatives to enhance sustainable development. Target indicators for sustainable development include, for example, water use, air and water quality, energy consumption, solid waste, education and business infrastructure, transportation, natural resource assets, and overall economic progress. Regardless of the form, collaboration can embrace a variety of community-based, intergovernmental, and market-based approaches.

Action 1

Foster regional and multijurisdictional approaches to environmental protection (e.g., to address land use, transportation, etc.), while maintaining national standards.³¹

Action 2

Develop and use strategic assessments of regional economic opportunities that support and are specific to watershed management approaches (e.g., Clean Water Action Program).

The policy of the **Cape Cod Commission** is to create diversified, sustainable development in the Cape Cod region. A regional approach is used to address environmental resource issues that cross traditional boundaries. The Commission encourages economic activities that minimize harmful impacts on the environment and society, while avoiding the after-the-fact regulatory battles and cleanup bills. The Commission embraces attempts to balance the competing needs for economic opportunity, social equity, and preservation of the historic and ecological legacy unique to the region.

The 14 river communities designated by a federal advisory committee under the **American Heritage Rivers Initiative** are experiments in how to combine economic development, environmental preservation, and cultural identification in positive community initiatives. All of this initiative’s ongoing efforts relate to the federal Clean Water Action Plan.

Action 3

Develop new mechanisms to attract capital to redevelop brownfields (with the overall goal of increasing the ratio of brownfields to greenfields use).

Action 4

Implement and apply sustainable development inventories to assess community environmental impacts, economic opportunities, and natural resources in a comprehensive manner.

Action 5

Encourage businesses and local governments to work with communities in setting environmental priorities for sustainable economic development and land use planning. (e.g., smart growth, smart transportation, redevelopment, etc.).

Recommendation 8

Involve individuals and communities in improving environmental performance.

Perhaps one of the biggest hurdles in moving towards sustainability is overcoming the lack of awareness about the environmental impacts of the lifestyle choices we make. Individuals make decisions every day — where to live, what form of transportation to use, what products to buy — that, in the aggregate, can lead to large-scale environmental impacts that are difficult to manage. In most cases, people make these decisions without adequate information, and often without any idea of the potential environmental consequences. Similarly, communities make decisions about zoning, housing, schools, transportation, and other pressing issues without accurate information on the relative environmental costs of their choices.

Governments, educational institutions, and businesses need to build a more common understanding of how the products we buy, the policies we adopt, and other everyday choices we make affect sustainability. While the Internet has made vast amounts of data widely available, we still face enormous challenges in turning data into useful information that can help people make choices, reaching people at all levels of society, integrating environmental knowledge and problem-solving skills into our educational system, and building a sense of individual responsibility for the environment.

Action 1

Provide information to and educate consumers and individuals about environmentally responsible household, lifestyle, and product choices.

The **Global Action Program** in New York tries to empower individual households to change personal behavior and to move consciously towards sustainable consumption. "EcoTeams" organize communities and households to analyze consumption patterns to reduce waste in the use of energy, transportation, and water resources. These EcoTeams work together and report their results to a national office, and their performance is compared to other teams. The impacts of EcoTeams are felt in homes and communities.

The **New Jersey Department of Environment's Watershed Management Approach** was developed to improve surface and groundwater quality and quantity for all uses with a performance-driven environmental management framework. New Jersey residents take on the responsibility of serving as stewards for their own watersheds. Information is acquired by the stakeholders (including NJDEP) and then is developed into a watershed management plan, which drives activities and investments in the geographic area. This approach allows stakeholders to determine the priority of problems and builds a better understanding of the environmental impacts of everyday activities.

Action 2

Develop and provide information to citizens and elected officials about the effects of proposed and existing government policies on sustainable development.

Recommendation 9

Identify risks and protect communities against disproportionate impacts.

It is argued that some low-income and minority communities have lacked equal environmental protection and have borne disproportionate or cumulative environmental burdens.³² Any future environmental framework must have processes in place to identify risks and ensure that environmental burdens are reduced, and that environmental protection is shared throughout and across all communities. Therefore, organizational responses need to focus on increased involvement of community representatives and interest groups in projects with environmental impacts.

Although several mechanisms are available to redress environmental impacts, it is more important to identify and prevent the conditions that can create inequities between communities. By taking steps to identify potentially inequitable environmental impacts, communities can begin to integrate sustainable development principles and practices fully. One step to prevent such impacts is to incorporate community issues early on in the decision-making processes of industries, government, and other relevant entities. Communities can increase their economic potential, quality of life, and overall livability if mechanisms are established to ensure that community representatives (not local government officials alone) are collaboratively involved in decision-making processes affecting the community.

Action 1

Develop and use sustainable development indicators to identify possible disproportionate economic, environmental, and social impacts on urban and rural communities.

Action 2

Collaboratively negotiate capital investment strategies for developing local economic opportunities that simultaneously address possible disproportionate impacts.

Action 3

Develop incentives that encourage organizations that achieve high levels of environmental protection to invest in economically distressed areas and hire employees from those distressed communities at unreduced wages.

Action 4

Adopt public and private sector approaches for environmentally and economically distressed communities that allow additional economic development while reducing total environmental burdens.

NEW APPROACHES TO PERSISTENT PROBLEMS AND EMERGING ENVIRONMENTAL ISSUES.

Although the United States has made great strides in addressing environmental problems, the nation and the world still face significant environmental challenges. Environmental professionals, lawmakers, nongovernmental organizations (NGOs), businesses, and others are struggling to understand and devise solutions to persistent and complex environmental problems as well as to new environmental challenges. Some of the persistent and complex environmental problems facing us today include pollution from myriad small, dis-

Minnesota's **St. Paul Port Authority's** brownfields redevelopment program is one of 16 "showcase communities" and has over 50 sites needing redevelopment. Due to scarce resources, the Port Authority determines which sites to remediate based on the extent of redevelopment costs, site configuration, and a variety of social justice indicators such as the level of unemployment, housing vacancies, and percentage of rental property. The redeveloped land is given away to businesses, which enter into an agreement with the Port Authority to retain and attract businesses to St. Paul. Agreements include design criteria relating to energy efficiency, local hiring guarantees for St. Paul residents, and livable working wages. The program is a success: the Port Authority has three to four businesses competing for each available opening. This program has generated over \$2 million a year in property taxes, created over 1,500 job in distressed communities, and created 900,000 square feet of building space in previously abandoned lots.

persed sources that are not easily reached through conventional regulatory approaches, but that cumulatively contribute significantly to pollutant loadings. Other challenges include land-based activities that create local problems — such as inadequately controlled land development (i.e., urban sprawl) and agricultural runoff — that are best addressed in the context of local community decisionmaking.

New issues doubtless will emerge in the next century that will also demand attention. These environmental challenges include global issues — such as climate change and long-range transport of persistent pollutants — that involve complex interactions between human activity and natural systems.

Recommendation 10

Develop new approaches to persistent problems and emerging issues.

To address both currently recognized environmental problems and those yet to be identified while moving towards sustainability, the environmental management framework needs to test and adopt new approaches. We need to enhance our ability to rethink the nature, source, and link-

ages of environmental problems by continuously learning from and using past experience to improve current performance. In the environmental field, that requires trying to understand who pollutes and why, and how their decisions are affected by those of others.

To deal with this broadening set of problems, the framework will, in the next century, include both traditional tools (national standards, permits, reporting, enforcement, etc.) and new approaches (market- and information-based approaches, stakeholder participation in decisionmaking, performance-based standards, etc.). Only those tools that best address a given problem in the most effective, efficient, and just manner will be applied to that problem. The result will be a framework that is less uniform and more complex but also more flexible. Such a framework will facilitate the development and tailoring of strategies that allow specific problems and opportunities to be identified and addressed.

The environmental management framework needs to test and adopt new approaches. . . The result will be a system that is less uniform and more complex but also more flexible.

Within the new framework, too, more research, sophisticated databases, and analysis are needed to identify systemic problems and major sources or causes of problems. For example, endocrine-disrupting chemicals are emerging as a potential global issue, but the sources and effects of these chemicals are still not well understood.

“Even in the face of scientific uncertainty, society should take reasonable actions to avert risks where the potential harm to human health or the environment is thought to be serious or irreparable.”

— *Sustainable America*, 1996

Foresight is a crucial element of sustainable development, and essential in a new environmental management



Photo: Stephen Delaney, U.S. Environmental Protection Agency.

framework. For example, the Swedish government has established goals for the phaseout of certain persistent substances in products. A “reverse engineering” process to determine how to reach the goals is being implemented in the hope of fostering innovation without creating new risks. By focusing on alternatives, goals, and severity of effects, the debate is shifted from causality to solutions. A process that weighs evidence about harm, but considers it in the context of available technologies and methods that eliminate or reduce the severity of the impacts, is critical to good decisionmaking.

Action 1

Promote early action on emerging issues by involving companies, NGOs, government stakeholders, and international partners in constructive dialogues on issues that will lead to solutions.

Action 2

Improve information strategies for emerging issues by securing commitments to support anticipatory research; and develop databases and analyze information to investigate unknown risks and understand the magnitude of their environmental and health impacts (e.g., endocrine-disrupting chemicals).

Action 3

Apply focused strategies to existing environmental problems that are inadequately addressed by traditional systems or programs (e.g., nonpoint source water pollution and dispersed air sources).

As we attempt to solve global issues in the 21st century, we need to strengthen our international partnerships.

We have much to share with other nations that are striving for sustainability, and also much to learn from them. Organisation for Economic Co-operation and Development countries with parallel economic and environmental histories, such as the United Kingdom, the Netherlands, Denmark, Germany, and Canada, offer valuable lessons that should be shared with U.S. communities and regulatory agencies. Such sharing is evident in New Jersey’s recent inclusion of Dutch pollution prevention policies, Chattanooga’s and Cape Charles’s use of Danish ecological industrial parks, and Wisconsin’s adoption of German acid rain programs.

The Council urges national and international governments, businesses, and NGOs to advance the dialogue about emerging environmental issues wherever possible. In the 1980s, the discovery of the ozone hole over Antarctica galvanized international action, resulting in the Montreal Protocol agreement to phase out the production of ozone-depleting chlorofluorocarbons (CFCs). Key to the protocol’s success was the general acceptance of the need for

For years, the San Francisco Bay has been subject to a buildup of copper pollution. Even though point source controls are fairly effective, copper in the Bay remains a problem. Recent studies indicate that the majority of copper pollution comes from nonpoint source runoff, with automotive brake pads accounting for 80 percent of the copper source. Copper from brake pads emerged as a water quality problem after regulation eliminated the use of asbestos in brake pads, and copper was substituted to meet automotive safety standards. In response, industry, government, and environmental leaders promptly formed the **Brake Pad Partnership Project**, a voluntary industry program to reduce the use of copper. The project establishes specific percentage reduction goals, and is proposing a research program to develop a methodology to fully evaluate the potential impacts of copper and other ingredients proposed for use in brake pads.

action, and consensus on what that action should be, by the various national governments, NGOs, and CFC-producing and -using businesses. We need to produce more of this kind of progress in concerted international efforts as we face the challenges of the future.