Sustainability, well being, and environmental protection: perspectives and recommendations from an Environmental Protection Agency forum

Dinah A. Koehler & Alan D. Hecht*
National Center for Environmental Research, Office of Research and Development, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460 USA (email: Hecht.Alan@epamail.epa.gov)

According to panelists at a recent EPA-sponsored forum, at its essence sustainability requires the simultaneous promotion of equitable economic growth, environmental protection, and social well being. Panel members, including economists, policy makers, sociologists, and business strategists, agreed that a sustainable economy should preserve its capacity to generate income, which is made possible by maintaining natural capital. However, they also noted that the limited data available leads to the conclusion that the current scale and quality of economic activity is reducing the capacity of the biosphere to sustain the economy, and is fundamentally unfair to future generations. For EPA to respond effectively, it will have to strengthen the integration of traditional physical and biological research with behavioral and economic research. It will also require institutions that support equitable access to resources and a political system that can respond to today’s poor as well as providing for future generations. Several panelists noted that habit formation and consumption patterns, which often lack a clear rational economic base, can significantly shape the relationship between income and well being. This research implies that public policy directed at sustainability can and should incorporate social values not necessarily reflected in the traditional economic theory of decision making. Several recommendations which emerged from the forum focused on the need to foster high quality data on sustainability indicators, policy mechanisms that use economic incentives, and public education regarding what constitutes sustainable decision making.

KEYWORDS: socioeconomic factors, environmental protection, public policy, sustainable development, resource management, rights of future generations

Introduction

The United States Environmental Protection Agency’s (EPA) Office of Research and Development (ORD) is currently developing a research strategy to further sustainability through advanced scientific understanding, applications of new technologies, and environmentally and economically sound public polices.1 A central element of this strategy is better integration of ongoing traditional physical and biological research with behavioral and economic research.2 This is particularly important as society faces difficult decisions related to simultaneously promoting in an equitable manner economic growth, environmental protection, and social well being.

Toward that goal, ORD organized a forum of experts from the physical sciences, economics, and public policy to provide input into developing its sustainability research strategy. This article summarizes what we see as the most salient analysis and recommendations presented by forum panelists. The forum program appears in the Appendix.3

Defining Sustainability and Metrics: Panelist Views

Herman Daly opened the first session with a definition of sustainability that recognizes that the biosphere, or natural capital, sustains the economy, which in turn supports quality of life (e.g., health, security, and the “pursuit of happiness”). He further explained that the biosphere is the total natural system of biogeochemical cycles powered by the sun.

1 The draft Sustainability Research Strategy is available at http://www.epa.gov/sustainability. This document is being peer reviewed by EPA’s Science Advisory Board and their final report will be published in early 2007.
2 ORD’s Economics and Decision Sciences extramural research program is described at http://es.epa.gov/ncer/science/economics/economics.html.
3 Précis papers prepared by forum presenters, as well as a rapporteur’s summary of the four panels, are available at http://www.epa.gov/sustainability/econforum.
The economy, on the other hand, is the subsystem dominated by transformations of matter and energy to serve human purposes. The problem, he explained, is that the current scale and quality of these transformations interfere significantly with the biosphere, reducing its capacity to sustain the economy, and are thus fundamentally unfair to future generations. This observation raises difficult questions, including what “sustaining the human economy” means: Is it a matter of achieving a given level of matter-energy throughput, gross domestic product (GDP), utility or welfare, total capital stock, or natural capital stock? Or does it mean sustaining a given rate of growth of any one of these indicators? Sustaining a rate of growth is vastly different from sustaining a certain level of growth. While panelists generally agreed on the need to sustain the biosphere, we note that historically humans have not revealed themselves to be effective environmental stewards—as attested in Jared Diamond’s (2004) compelling review of ancient and modern societies whose depletion of natural resources have led to their own destruction.4

Building on Daly’s view, several forum panelists proposed that sustainability should incorporate non-declining levels of ecosystem services and community welfare, as well as distributional equity among generations. Bhavik Bakshi elaborated that a sustainable economy should preserve its capacity to generate income, which is made possible because natural capital is maintained. Geoffrey Heal noted that sustainability encompasses two equally important functions: fairly distributing economic benefits over time and limiting the negative environmental impact of economic activity. Another way to assess sustainability, according to William Pizer, is to ask whether a current action (or absence of action) leaves future generations with less desirable options than those enjoyed by the current generation.

Panelists and discussants agreed on the difficulty of defining indicators that could demonstrate the existence of sustainability. Bakshi observed that in practice the opposite has been easier, the development of metrics that signal unsustainable actions. Unfortunately, the number of environmental indicators regularly measured in the United States has been decreasing, as has the number of measurements of these indicators. As a consequence, the task of deriving either positive or negative metrics for sustainability is becoming more difficult. Anthony Janetos contended that the paucity of management systems to track changes in the environment is making the transition to sustainability ever more challenging. He further remarked that several significant indicators suggest that today’s generation is not better off than previous generations, implying that our social and economic systems may have already become unsustainable. The limited available data, such as that presented in the United Nations-sponsored Millennium Ecosystem Assessment (2005), indicate that the biosphere’s carrying capacity is already declining.

Social and Institutional Contexts of Decision Making for Sustainability: Panelist Views

Several panelists agreed that the traditional economic model of rational decision making does not accurately reflect actual economic behavior. As such, it has limited worth for understanding and encouraging sustainability. John Gowdy noted that individual valuation of monetary payoffs depends on the social context. Pizer expanded upon this observation, pointing out that survey and experimental evidence suggest that habit formation and relative consumption effects, which often lack a clear rational base, may significantly shape the relationship between income and well being. Gowdy, in turn, recommended that EPA research and policies should incorporate these findings by exploring the use of citizen juries and community-valuation workshops to add subjective measures of well being to cost-benefit analysis. Should this valuation research find evidence of the features of persistence, irreversibility, and non-substitutability that are embedded in the concept of sustainability, according to Pizer, EPA then may not need to develop an entirely new approach to valuation and decision making for sustainability.

Another research challenge advanced by Mark Anielski is to discover suitable weights or values to place on sustainability indicators. Lisa Wainger further suggested that consideration of the social context of decision making implies that sustainability policies should reflect socially acceptable risk levels for various ecological services. Therefore, risk-tolerance concepts should be introduced to help develop hierarchical measures of sustainability, facilitate communication, and improve decision making. Such a risk-based approach would acknowledge uncertainty and shift the focus of sustainability from a purely technical one to a consideration of collective risk tolerance.

Forum panelist Richard Howarth argued that if government agencies are to fulfill their trusteeship duties under the sustainability principle they must conserve and sustain the services provided by natural systems to ensure that future generations are justly valued.

4 Diamond (2004) argues that the natural system is at the center of economic growth. Rejecting the common assertion that “the environment has to be balanced against the economy,” he insists that “this quote portrays environmental concerns as a luxury, views measures to solve environmental problems as incurring a net cost, and considers leaving environmental problems unsolved to be a money-saving device. This one-liner puts the truth exactly backward.”
compensated for environmental degradation. This re-orientation has implications for how EPA and other government agencies are organized. For example, forum participants noted the need for a more holistic regulatory focus on the circular flow of material based on the cradle-to-cradle concept advanced by William McDonough and Michael Braungart (2002) instead of the current media-focused approach that underlies EPA’s current organizational structures and environmental regulations. Bryan Norton called for building institutions that support equitable access to resources and shaping the political system to both respond to today’s poor and provide for future generations. To carry out this dual task, communication must reflect the interdisciplinary nature of the discourse on sustainability and create language that is more accessible to the broader public. Meghan Chapple-Brown urged EPA to create win-win outcomes for the economy and the environment by assisting firms to use sustainability as a driver for market innovation. Responding to Dinah Koehler’s observation that market-driven technological development has promoted environmental degradation, Geoffrey Heal noted that government’s role is to apply taxes or other interventions to internalize the negative environmental impacts of new technology. Such an outcome requires government action that extends beyond free markets. EPA can thus contribute to developing a social context receptive to sustainability, rather than relying on the optimistic assumption that individuals will promote sustainability by following an innate economic rationale.

**What’s An Agency to Do?**

EPA has recently undertaken several activities that reflect sustainability imperatives. At the request of the agency administrator, senior EPA managers have prepared a new stewardship initiative aimed at encouraging stewardship-related activities by individuals, businesses, and government. The report *Everyday Choices: Opportunities for Environmental Stewardship* recognizes that our nation’s natural resources are the common property of all Americans of this and future generations, and that collective action is needed to adequately protect these resources. In this document, the senior managers describe sustainable outcomes in six resource areas relevant to EPA’s mission (see Table 1). This initiative marks the first explicit statement in which EPA senior leadership has focused on sustainability outcomes for the nation. Table 1 provides an important starting point for discussion of appropriate sustainability goals and how they should be measured.

| Natural Resource Systems | Sustainable Outcomes |
|--------------------------|----------------------|
| Energy                   | Generate clean energy and use it efficiently. |
| Air                      | Sustain clean and healthy air. |
| Water                    | Sustain water resources of quality and availability for desired uses. |
| Materials                | Use materials carefully and shift to environmentally preferable materials. |
| Land                     | Support ecologically sensitive land management and development. |
| Ecosystems               | Protect and restore ecosystem functions, goods, and services. |

This emphasis on achieving sustainable outcomes has profound implications for EPA. In the preface of *Everyday Choices*, current EPA administrator Steve Johnson observed a natural evolution in thinking about the environment—from pollution control, to pollution prevention, to sustainability.

In the 1970s, pollution from single sources was the obvious immediate challenge. In the following decades, pollution sources were understood to be more diverse, and regulations and public polices began to target preventing pollution rather than cleaning it up. Today, environmental stresses are increasingly global due to greater economic integration.

**Recommendations of Forum Participants**

If EPA is to achieve major progress towards sustainability, it must recognize and carry out at least three clear mandates that we see as salient recommendations from the Forum on Sustainability, Well Being, and Environmental Protection:

Promote the collection and availability of high-quality data for sustainability indicators and the development of appropriate new indicators.

Existing systems to monitor and assess environmental health are under stress. Many existing systems represent a significant weakness in our ability to measure progress toward sustainability. EPA’s 2003 *Draft Report on the Environment* (RoE) provides a snapshot of the state of the environment across air, water, materials, energy, and land.

---

5 Report available at http://www.epa.gov/innovation.

6 The forward-looking RCRA 2020 Strategy of EPA’s Office of Solid Waste recognizes the unsustainable nature of managing waste and advocates a shift toward management of materials. This report is available at http://www.epa.gov/osw/vision.pdf.

7 There is always the question of whether we will ever have all the data we need. The answer is no. But the salient issue is asking the correct questions, which in turn direct how data are collected and how environmental outcomes are measured.
Develop and implement voluntary programs and market-oriented policies that use economic incentives to foster sustainable and equitable outcomes.

In 1999, the Organization for Economic Cooperation and Development (OECD) identified 42 voluntary environmental initiatives in the United States with an estimated 13,000 participants. The vast majority of these (33) are public voluntary programs that were launched by EPA during the 1990s, with a large number focusing on global climate change (OECD, 2003). Other voluntary approaches in the United States include negotiated agreements, industry-initiated unilateral commitments, and state and regional voluntary initiatives (Brouhle, et al. 2005). Despite this significant number of innovative programs, EPA continues to rely on more traditional forms of environmental regulation and in particular on standards-based regulation. Given the global nature of a growing set of environmental problems, from transboundary pollutants to climate change, EPA will increasingly seek to pursue voluntary agreements precisely because they do not involve extraterritorial jurisdiction.

Like voluntary agreements, support for market-oriented policies such as economic incentives has grown in the last fifteen years. Crafted as an alternative to traditional command-and-control legislation, economic inducements reward or punish behavior, usually through price mechanisms such as penalties or fines. However, such policies do not specify how a facility or firm must achieve reductions in its environmental impact. The most widely recognized technique is tradable emissions permits such as the highly successful cap-and-trade program for sulfur dioxide. Because such measures allow facilities and firms more flexibility, market-based incentives generally appear to reduce the cost of pollution abatement while generating environmental improvements (see, e.g., Harrington et al. 2004). While in theory this kind of steering may impose additional costs on firms beyond what is required to achieve compliance, in practice governments have either given away permits without charge (rather than auctioning them off) or returned revenues from effluent taxes to firms (Oates, 2006).

The growing public and political support for market-oriented policies in the context of the forces of globalization means that the achievement of sustainable outcomes, based upon metrics as described above, will require more flexible policy tools. To date, there is no clear consensus that market-oriented policies will erode the competitive position of the United States, due in part to the finding that pollution abatement costs are generally less significant than the material and labor costs associated with production.
Use education and outreach to inform and motivate, creating the social context for sustainable decision making by consumers, investors, businesses, and all levels of government.

Countless government and business decisions are made every day, affecting all aspects of sustainable resource use. For instance, business decisions regarding material use and industrial processes affect energy and water use, waste management, and human health. These highly decentralized decisions are influenced by regulations such as the Clean Water Act that control the most obvious pollution releases and ensure multiple uses of natural resources. Most federal environmental laws are delegated to the states and to Native American tribes for implementation. Decisions at state and local levels affect urban development, land use, and provision of public services. What happens at subnational levels is thus an important yardstick for measuring progress on sustainability.

How can EPA best use its resources to motivate business to consider goals of sustainable outcomes and to help states and local communities achieve their sustainability objectives? Looking ahead, it is clear that EPA must have the technical, monitoring, and analytic capability to aid decision makers in government and the private sector to act in ways that foster sustainable outcomes. EPA’s Environmental Economics Research Strategy (EERS) identifies and prioritizes research that strengthens the scientific foundation for understanding how firms and individuals make decisions, based both upon the traditional economic rational actor paradigm and upon newer behavioral economics frameworks.11

From a scientific perspective, EPA research has evolved to reflect the new roles and responsibilities that Congress recognized in 1998:

While acknowledging the continuing need for science and engineering in national security, health, and the economy, the challenges we face today cause us to propose that the scientific and engineering enterprise ought to move toward center stage in a fourth role; that of helping society make good decisions.

We believe this role for science will take on increasing importance, particularly as we face difficult decisions related to the environment [emphasis added] (United States House of Representatives, 1998).

From a regulatory and policy perspective, EPA has relied upon four approaches to achieving environmental outcomes: endorsing, facilitating, partnering, and mandating:12

- **Endorsing** encompasses policies that reward or encourage sustainable behaviors, such as EPA’s Energy Star and Design for the Environment.
- **Facilitating** involves activities that provide information, funding, or incentives to advance sustainable behavior. These initiatives include a suite of EPA programs on consumer information, energy and water use, and industry programs such as Performance Track, as well as EPA’s newest initiative on stewardship.
- **Partnering** includes a host of programs around collaborative problem solving and voluntary programs such as EPA’s Climate Partnerships.
- **Mandating** relates to policy or regulations such as the National Environmental Policy Act, the Clean Air Act, and Clean Water Act, as well as presidential executive orders.

The extent to which EPA is innovative and effective in using these four approaches—actions that influence decision makers in business and government—may well determine the nature and degree of sustainability in 2020.

**Postscript**

Since the December 2005 forum, ORD has moved forward with its Sustainability Research Strategy and is beginning to integrate sustainability objectives into the EERS and other existing ORD research programs. This integration will be reflected in future proposal solicitation topics. More broadly, EPA is continuing to advance its newly defined stewardship agenda and is working to better define and measure sustainable outcomes. The agency has made stewardship and sustainability a new element of Goal V (“Enhance Society’s Capacity for Sustainability through Science and Research”) of its draft 2007-2011 Strategic Plan, calling for “conducting leading-edge, sound scientific research on pollution prevention, new technology development, socioeconomic, sustainable systems, and decision-making tools.”

---

11 EERS is available at http://yosemite.epa.gov/ee/epa/eed.nsf/web pages/EEResearchStrategy.html.

12 This taxonomy is adopted from Ward (2004).
Authors’ Note

The authors are solely responsible for the contents of this paper which does not represent EPA policy.

References

Brouhle, K., Griffiths, C., & Wolverton, A. 2005. The use of voluntary approaches for environmental policymaking in the U.S. In E. Croci (Ed.), The Handbook of Environmental Voluntary Agreements. pp. 107–134. New York: Springer.

Diamond, J. 2004. Collapse: How Societies Choose to Fail or Succeed. New York: Viking.

Greenstone, M. 2002. The impacts of environmental regulations on industrial activity: evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufacturers. Journal of Political Economy 110(6):1175–1219.

Harrington, W., R. Morgenstern, & T. Sterner (Eds.). 2004. Choosing Environmental Policy, Comparing Instruments and Outcomes in the United States and Europe. Washington, DC: Resources for the Future Press.

McDonough, W. & Braungart, M. 2002. Cradle to Cradle: Remaking the Way We Make Things, New York: North Point Press.

Millennium Ecosystem Assessment. 2005. Ecosystems and Human Well-being: General Synthesis. Washington, DC: Island Press.

National Research Council. Committee on Metrics for Global Change Research. 2005. Thinking Strategically: The Appropriate Use of Metrics for the Climate Change Science Program. Washington, DC: National Academies Press.

Oates, W. (Ed.). 2006. The RFF Reader in Environmental and Resource Policy. Washington, DC: Resources for the Future Press.

Organization for Economic Cooperation and Development (OECD). 2003. Voluntary Approaches for Environmental Policy: Effectiveness, Efficiency, and Usage in Policy Mixes. Paris: OECD.

Palmer, K., Oates, W., & Portney, P. 1995. Tightening environmental standards: the benefit-cost or the no-cost paradigm? Journal of Economic Perspectives 9(4):119–132.

United States House of Representatives. Committee on Science. 1998. Unlocking Our Future: Towards A New National Science Policy. Washington, DC: Government Printing Office. http://www.house.gov/science/science_policy_report.htm.

Ward, H. 2004. Public Sector Roles in Strengthening Corporate Social Responsibility: Taking Stock. Washington, DC: The World Bank.
Appendix: Forum Program and Discussion Points

Panel 1: Basis
The panel discussed the following questions:
- Is intergenerational equity a reasonable definition of sustainability? Conceptually and operationally, how do you conceive and define intergenerational equity (e.g., as constant or non-declining utility, GDP, throughput, human-made capital, natural capital, total capital)?
- How does concern for sustainability comport with the claim that each generation is generally better off than those that preceded them? Is this claim historically true? If so, over what time period, and is it likely to remain true?
- How does sustainability relate to environmental protection?

Moderator: Herman Daly, Professor of Public Affairs, University of Maryland
Panelists: Anthony Janetos, Vice President, The Heinz Center
Geoffrey Heal, Professor of Public Policy and Business Responsibility, Columbia University
Bryan Norton, Professor of Philosophy, Georgia Institute of Technology

Panel 2: Measurement
Questions considered by the panel included:
- What frameworks for sustainable development indicators (e.g., national accounts, material flows) are likely to be most useful for decision makers?
- What are the roles, strengths, and weaknesses of biophysical, economic, and social indicators related to sustainable development?
- Are there assets that are non-substitutable, and how should these affect measurement?
- Will aggregate sustainable development indicators be useful for environmental agencies, given that environment is simply part of the sustainable development puzzle?

Moderator: Kirk Hamilton, Lead Environmental Economist, The World Bank
Panelists: Mark Anielski, Independent Consultant
Bhavik Bakshi, Professor of Chemical and Biomolecular Engineering, Ohio State University
Joy Hecht, Independent Consultant
Lisa Wainger, Research Scientist, University of Maryland

Panel 3: Policy Options
The discussion centered on the following questions:
- What do we mean by “sustainability policy”? How is it different from environmental protection policy?
- What tools do we need to use to promote sustainability?
- How should EPA work with other agencies to affect their rules and regulations, which, although not explicitly environmental, affect corporate behavior and the flow of resources through the economy?
- Should EPA try to influence consumer preferences?

Moderator: Jay Benforado, Director, National Center for Environmental Innovation, U.S. EPA
Panelists: Richard Howarth, Professor of Environmental Studies, Dartmouth College
Meghan Chapple-Brown, Senior Advisor, SustainAbility
Bryan Norton, Professor of Philosophy, Georgia Institute of Technology

Panel 4: Policy Assessment
The overarching question is:
- Does the adoption of sustainability as a major policy objective suggest the need for changes in the assessment process for EPA?

Moderator: Tom Tietenberg, Professor of Economics, Colby College
Panelists: John Gowdy, Professor of Economics, Rensselaer Polytechnic Institute
Richard Howarth, Professor of Environmental Studies, Dartmouth College
William Pizer, Fellow, Resources for the Future
Michael Toman, Professor of International Relations, Johns Hopkins University