

## REPORT ON REPORTS

# Indicators of Progress

## *The State of the Nation's Ecosystems: Measuring the Lands, Waters, and Living Resources of the United States*

Reviewed by David P. Clarke

In the United States and elsewhere, the public has long been accustomed to economic indicators such as the Dow Jones index and the gross domestic product (GDP), which condense voluminous data into a single number that suggests whether economic performance is getting better or worse, thereby helping decision makers craft policy responses. Similarly, many people use indicators such as cholesterol and blood pressure levels to help guide their health care decisions. But, despite clear support for equivalent indicators to determine whether environmental conditions are improving or declining to help guide environmental policy decisions, we have yet to systematically collect the necessary data and periodically publicize the results. But that is changing. With the September 2002 publication of *The State of the Nation's Ecosystems: Measuring the Lands, Waters, and Living Resources of the United States*, The H. John Heinz III Center for Science, Economics and the Environment (The Heinz Center) has made a valuable contribution toward actualizing the potential of this powerful policy tool.<sup>1</sup>

Not that environmental indicators have been entirely ignored until now. As early as 1970, the U.S. Council on Environmental Quality (CEQ) in its first annual report to Congress pointed out the need for a periodic report to tell the nation "how we are doing" in protecting the environment. But, CEQ noted, the nation's environmental management system at the time did "not provide the type of information or coverage necessary to evaluate the condition of the Nation's environment or to chart changes in its quality and trace their causes."<sup>2</sup> It still doesn't, as The Heinz Center report makes abundantly clear. In the United States

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in 1996, the Executive Office of the President held a National Environmental Monitoring and Research Workshop to address the issue of indicators. In 1997, the National Science and Technology Council (NSTC) published *Integrating the Nation's Environmental Monitoring and Research Networks and Programs: A Proposed Framework*.<sup>3</sup> And in 2000, the National Research Council (NRC) published a report, *Ecological Indicators for the Nation*, that concluded such indicators "can and should guide policy and help direct research."<sup>4</sup> They still can and should, but don't. NSTC's 1997 report, developed by federal agencies serving on the council's Committee on Environment and Natural Resources, inventories major federal programs for environmental monitoring and related research programs and proposes a hierarchical framework based on the National Weather Service model that includes monitoring at three levels: simultaneous and intensive monitoring of large regions, sampling of a subset of a region, and sampling of specific locations. The NRC report, requested by the U.S. Environmental Protection Agency (EPA), provides a framework for selecting indicators based on criteria such as general importance, conceptual basis, and reliability. The report also suggests possible indicators for national ecological assessments, without actually developing the indicators the way The Heinz Center report does.

### A Tipping Point

Perhaps The Heinz Center report, begun in 1997, will provide the "tipping point" for various related efforts that have not

quite crystallized into a national commitment to developing and using environmental indicators. Already, the report has significantly influenced EPA's emerging activity in this area. In November 2001, EPA Administrator Christine Todd Whitman announced an agency-wide "Environmental Indicators Initiative" whose first product—a *Report on the Environment*—is due out for public comment this spring. EPA has said that its own report will use elements of The Heinz Center report, which, as the most recent and most comprehensive report of its kind, could well set the standard for any future national indicators system.

There are other reasons to be hopeful that environmental indicators may at last be coming of age. In a separate effort, the EPA Office of Children's Health early this year published the second edition of *America's Children and the Environment*, providing measures of environmental contaminants affecting children.<sup>5</sup> EPA also is working with other nations to explore the development of global and U.S. indicators for children's health and the environment.

In addition, the Centers for Disease Control (CDC) has begun publishing a National Report on Human Exposure to Chemicals that uses biomonitoring—or the monitoring of human blood, urine, and other biological samples—to assess the extent to which the U.S. population is exposed to chemicals. While these are not ecosystem indicators, CDC's second report, published in January 2003, provides exposure data on 116 chemicals found in the environment.<sup>6</sup> Over time the reports will provide highly useful data on important indicators of human exposure.

More broadly, the *Government Performance and Results Act of 1993* requires federal agencies to develop five-year strategic plans with goals and measures that demonstrate to the U.S. Congress and to the public that the agencies are making tangible progress toward their missions. When properly implemented, this law will necessitate the serious development of indicators and measures to track them. A U.S. interagency working group on sustainable development indicators has developed 40 indicators. Internationally, the Organisation for Economic Co-operation and Development, of which the United States is a member, has developed an analytical framework for dealing with sustainable development indicators.

## Political Controversy

Despite interest in environmental indicators going at least as far back as the CEQ's 1970 report, past efforts too often have become mired in political controversy. Fully aware of this limitation, The Heinz Center project took deliberate steps to

ensure a report untainted by political bias.<sup>7</sup> While the report is written for decision makers and opinion leaders concerned about the "big picture" of the nation's ecosystems, it deliberately and conscientiously sticks with facts about ecosystem conditions without judging whether those conditions are "good" or "bad." This neutrality palpably frustrated House Science Committee members during hearings held the day the report was released. They looked for representatives of The Heinz Center to give them a definitive policy recommendation on what to do about environmental conditions—an answer to the question, "So what?"—but the report is unshakably mum on that matter. It provides time trends and maps that can be used for regional comparisons to help readers interpret whether

things are up or down, but policy makers will not escape the responsibility of deciding for themselves what significance to give the report's findings. In addition, the report does not identify what "stresses," or "pressures," might be causing changes seen in ecosystems; members of Congress and other policy makers will have to identify not only whether the conditions are a problem but also what might be causing the

problem and therefore what might need to be changed.

Although the report's avoidance of policy and strict adherence to reporting of scientific data may frustrate some would-be users, this neutrality was essential to The Heinz Center's success in completing the report and in making it palatable to many potential users in the policy arena. As chapter 1 notes, in describing the origin, principles, and process for developing the report, the project participants understood that, "Too many earlier efforts were disregarded because they were perceived as willing to accept any data available, or because their conclusions were not based on sound science." Furthermore, "Too many previous reporting efforts failed because they were perceived to be politicized or because they seemed to promote the perspectives of particular interests."<sup>8</sup>

## A Nonpartisan Consensus

The report got its start in the Clinton administration's White House Office of Science and Technology Policy, which asked The Heinz Center to "create a nonpartisan, scientifically grounded report on the state of the nation's environment." Because it hewed tightly to these goals, the project was able to bring together nearly 150 individuals from businesses, environmental organizations, universities, and federal, state, and local government agencies to develop 103 scientifically sound and nonpartisan environmental indicators. Members of the report's Design Committee and technical Work Groups dis-

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cussed and negotiated the indicators, thrashing out agreements on value-laden questions of what *should* be measured—what ecosystem characteristics were most important to include in a balanced national report—before going on to determine what high-quality data might be available to report on current conditions and historic trends for the selected characteristics.

As a result, the report identifies what we need to know about ecosystems to determine how well we are protecting them, regardless of whether we have the data necessary to tell us what we need to know. This template is powerful. Past indicator efforts have focused on ecosystem characteristics for which data happened to be available, even if those characteristics were not necessarily the right ones to gauge ecosystem health. It is highly instructive that when The Heinz Center participants got to the stage of the report where they sought data for each of the indicators, they discovered a startling number of gaps in the data. The report details these data gaps of varying degrees found in over two-thirds of the ecosystem indicators.

Prior to releasing the final report, the project released a prototype report for public comment in late 1999—after two years of intensive work—covering three of the six ecosystems described in the final report: forests, farmlands, and coasts and oceans.<sup>9</sup> Later, fresh waters, grasslands and shrublands, and urban and suburban areas were added, and an earlier version of the final report was sent out in late 2001 for external review. That draft received close to 100 sets of comments from business, environmental, government, and academic experts.

Chapter 2 of the final report, “The Reporting Framework,” describes the six major ecosystem types that together cover “all the lands and waters of the United States, including the ocean out to the limit of U.S. national jurisdiction.”<sup>10</sup> It also lays out the ten major characteristics used to describe the six ecosystem types, such as the extent of the ecosystem and its fragmentation and landscape pattern; its chemical contaminants and physical conditions; biological components such as plants and animals within the ecosystem type; and its human use for food, fiber, and water, and other services. If we could understand what conditions prevail in the six major ecosystems for each of these characteristics, we would have a good grasp of “the state of the nation’s ecosystems.”

But, as summarized in chapter 3, “what we know and what we don’t know” about the state of the nation’s ecosystems is spotty at best. For instance, we learn that of the 103 indicators only 58 (56 percent) can be reported nationally; only 33 of these (32 percent) have “all data” needed; and 25

(24 percent) have “some data.” But 45 indicators (44 percent) cannot be reported nationally, with 31 indicators (30 percent) having inadequate data and 14 (14 percent) needing “further development” because, for example, scientists do not currently agree on the single best “measure” for the particular indicator.

## Core National Indicators

In an effort to provide a national snapshot, as distinct from ecosystem-specific pictures for each of the six major types, the report offers ten “core national indicators.” These include three for which all the necessary data are available: the movement of nitrogen across the country; trends in plant growth in different regions; and quantities of food and fiber production and water withdrawals. They also include three needing further indicator development: the degree to which natural lands are fragmented; the conditions of plant and animal communities; and the services—other than commodity goods—provided by ecosystems, such as soil building and flood protection. The physical extent of the six major ecosystems, their chemical contamination levels, the number of at-risk native species, and the types and frequencies of outdoor recreation are somewhere between having “all necessary data” and needing “further development.” This mixture should provide a good sense of our present overall ability to rely on ecosystem indicators.

At the heart of the report are its six chapters describing the individual indicators for each of the major ecosystem types. Using attractive color graphs, charts, and tables, the report presents a series of single-page indicators explained in a question and answer format: “What is this indicator, and why is it important?” “What do the data show?” “Why can’t this indicator be reported at this time?” Easily understood icons appear throughout the report: For instance, “have all data” is symbolized by ● and “data not adequate for national reporting” is symbolized by ⊖, allowing the reader to instantly grasp each indicator’s status. Under “Coasts and Oceans” one finds the indicator “sea surface temperature” (SST)—an ● indicator. The report explains that this is a physical indicator measuring whether SST is above or below average and that SST directly affects plant and animals species. While the data shows SST varies noticeably from year to year, the data presented “do not show any trends.” All 103 indicators are presented in this fashion, under separate color-coded sections for each of the six major ecosystem types. A final technical notes section explains the indicators and their

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underlying data in greater detail, further elaborates on data gaps, and provides references. The report is available online at [www.heinzctr.org/ecosystems/](http://www.heinzctr.org/ecosystems/), enabling users to “drill down” into extensive detail.

The Heinz Center plans to publish successor reports, with the next targeted for 2007, and clearly states its modest view of what this “first in a series” has accomplished. “We believe the articulation of a coherent framework for reporting, a clear-eyed assessment of the strengths and weaknesses of available data, and the identification of data gaps are important advances,” the report notes. “Its strengths notwithstanding, however, we are well aware that this report is at best an early step on a long path toward realization of the comprehensive, mature, and well-grounded system of ecosystem and environmental reporting that the nation deserves.”<sup>11</sup>

For anyone who has followed the various environmental indicator initiatives described above and expectantly looked for signs of a breakthrough, The Heinz Center report and commitment to issuing future updates should be welcome news. Now, one can only hope that the press of competing needs in a post-September 11 world doesn’t further delay the long-standing demand for a rational, factual foundation for environmental policymaking. We have clearly seen its contours; now let’s see it fully fleshed out.

David P. Clarke is a senior director of the science policy team at the American Chemistry Council. He provides advice and support on issues relating to science policy, risk assessment, and cost-benefit analysis. He is also a contributing editor to the Society for Risk Analysis’s *RISK Newsletter* and has published articles in a number of environmental magazines and journals, including *Environmental Forum*, *Environmental Law*, and *Garbage: the Practical Journal for the Environment*. He can be contacted by e-mail at [David\\_Clarke@americanchemistry.com](mailto:David_Clarke@americanchemistry.com).

1. The H. John Heinz III Center for Science, Economics and the Environment, *The State of the Nation’s Ecosystems: Measuring the Lands, Waters, and Living Resources of the United States* (New York: Cambridge University Press, 2002). The entire report is also available at <http://www.heinzctr.org/ecosystems/>.

2. Council on Environmental Quality, *Environmental Quality: The First Annual Report of the Council on Environmental Quality* (Washington, D.C.: U.S. Government Printing Office, 1970), 237.

3. Executive Office of the President, National Science and Technology Council, Committee on Environment and Natural Resources, National Environmental and Research Workshop Proceedings, 27 February 1997.

4. National Research Council, *Ecological Indicators for the Nation* (Washington, D.C.: National Academy Press, 2000), 18.

5. U.S. Environmental Protection Agency, *America’s Children and the Environment: Measures of Contaminants, Body Burdens, and Illnesses*, Second Edition, EPA 240-R-03-001, (Washington, D.C., 2003).

6. Centers for Disease Control and Prevention, *Second National Report on Human Exposure to Environmental Chemicals*, NCEH 02-0716 (Atlanta, Ga., 2003). The report is also available at <http://www.cdc.gov/exposurereport/>.

7. For more information on the making of The Heinz Center report, see R. O’Malley, K. Cavender-Bares, and W. C. Clark, “Providing ‘Better’ Data—Not As Simple As It Might Sound,” *Environment*, May 2003, 8-18.

8. The H. John Heinz III Center for Science, note 1 above, page 4.

9. See R. O’Malley and K. Wing, “Forging a New Tool for Ecosystem Reporting,” *Environment*, April 2000, 20-31.

10. The H. John Heinz III Center for Science, note 1 above, page 9.

11. *Ibid.*, page viii.