Engaging Voices

Stakeholders and the Development of National Environmental Indicators:

Case Studies from the Sustainable Roundtables, EPA, and the Heinz Center

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TABLE OF CONTENTS

EXECUTIVE SUMMARY 5

INTRODUCTION 7

CONTEXT AND BACKGROUND 8

THE NEED AND DEMAND FOR NATIONAL ENVIRONMENTAL INDICATORS 8
OBSTACLES TO DEVELOPING NATIONAL ENVIRONMENTAL INDICATORS 10
OPPORTUNITIES FOR DEVELOPING NATIONAL ENVIRONMENTAL INDICATORS 11

THE CASE STUDIES: ORIGINS AND STATUS 12

ROUNDTABLE ON SUSTAINABLE FORESTS (RSF) 12
SUSTAINABLE MINERALS ROUNDTABLE (SMR) 13
THE SUSTAINABLE RANGELANDS ROUNDTABLE (SRR) 13
THE SUSTAINABLE WATER RESOURCES ROUNDTABLE (SWRR) 14
THE HEINZ CENTER'S STATE OF THE NATION'S ECOSYSTEMS REPORT 14
EPA DRAFT REPORT ON THE ENVIRONMENT 16
EPA DRAFT REPORT ON THE ENVIRONMENT 15

RESEARCH METHODS 17

ANALYTICAL FRAMEWORKS 17
RESEARCH COMPONENTS 18

KEY FINDINGS FROM THE FOUR ROUNDTABLES, EPA, AND HEINZ CENTER INITIATIVES 19

A FRAMEWORK FOR MEASURING "EFFECTIVENESS" 19
KEY EFFECTIVENESS FINDINGS 20
KEY DESIGN FINDINGS 24

DISCUSSION 26

FRAMING CONCEPTS 26
STAKEHOLDER ENGAGEMENT: KEY DRIVERS OF PERCEIVED EFFECTIVENESS 27
DESIGN CHOICES AND THE SIX CASE STUDIES 30
STAKEHOLDER ENGAGEMENT AND A NATIONAL INSTITUTION FOR ENVIRONMENTAL INDICATORS 34

CONCLUSION: OBSTACLES AND OPPORTUNITIES 36

NOTES 37

TABLE OF FIGURES AND TABLES

FIGURE 1: ORIGINS OF THE CASE STUDIES 17

FIGURE 2: ANALYTICAL FRAMEWORK 19

FIGURE 3: CRITERIA MEANS ACROSS INITIATIVES 23

TABLE 1: GROUPING OF PROGRAMS BY CRITERIA 24

TABLE 2: CASE STUDIES BY CRITERIA 26

TABLE 3: DESIGN DIMENSIONS 27

FIGURE 4: A TIERED, MULTI-FUNCTIONAL ORGANIZATIONAL STRUCTURE FOR STAKEHOLDER ENGAGEMENT 31

FIGURE 5: NATIONAL BUREAU OF ENVIRONMENTAL STATISTICS 39

Executive Summary

THE ISSUE

Environmental policy in the United States is one of the most polarized and contested areas in both national and local politics, and much of that contestation is driven by a lack of agreement regarding a national set of environmental indicators. While national economic policy is guided by a credible and well-respected set of economic indicators monitoring the state of the economy, Congress, the President, and federal, state, and local agencies are making critical decisions regarding natural resources without similar knowledge about the environment. Interest groups from across the spectrum continuously contest these decisions as disconnected from good science and reality, and often they are correct.

The $600 million worth of environmental data collection and analysis that is conducted is spread across the federal government in a myriad of separate and unconnected agencies.[1] A comprehensive and integrated presentation of the important results from these programs is not available, and efforts to coordinate and reduce costly overlap among them are limited.

Several initiatives are currently underway to correct these problems, but unless relevant stakeholder groups are effectively engaged and supportive, these attempts may fail to successfully influence and improve policy-making. Robust strategies and mechanisms to involve the public may indeed be critical to the successful development of national environmental indicators. A key question, therefore, is what strategies and mechanisms most effectively engage stakeholders in this process?

KEY FINDINGS

Research on six case studies of environmental indicator initiatives, including the Environmental Protection Agency's Draft Report on the Environment, the Heinz Center's State of the Nation's Ecosystems Report, and the four inter-agency Sustainable Roundtables, provide several important insights on designing stakeholder participation processes. First of all, in thinking about the most effective ways to engage stakeholders, the primary goal of engagement is assumed to be increasing the overall effectiveness and likelihood of success of the indicator development process. The analysis, which is based on extensive document review, meeting observation, 40 participant interviews and over 100 online survey responses, suggests several key findings related to this goal. Specifically, stakeholder participation processes that are more likely to be effective incorporate the following design choices:

- ***Educative and deliberative forums:*** Such forums enable participants to learn about each other's perspectives, encourage open and serious deliberation between participants, and build trust and respect among diverse interest groups.
- ***Advisory pathways:*** Participants are able to openly and directly express their opinions to decision-making authorities.
- ***Problem-solving opportunities****:* Stakeholders are encouraged to work with federal agency staff in actively selecting, improving, and populating the indicators.
- ***Decision-making authority:*** Important decisions about the composition and nature of the indicators are delegated to participatory processes.
- ***Strong and diverse funding support:*** Finances from a broad range of public and private sources are sufficient to cover meeting expenses and participant travel costs, hire staff support, and pay for project overhead.
- ***Diverse, balanced and representative participants:*** A balanced set of stakeholders come from a wide spectrum of sectors and organizations with diverse interests.
- ***Iterative and remote participation:*** Participants meet many times, and continue interacting and collaborating with each other outside of face-to-face meetings.
- ***High-status leadership:*** The leaders of the process are well-known and knowledgeable in their sector, and catalyze the participation of other stakeholders.

- ***Independent facilitation:*** Facilitators and organizers are perceived as neutral and not biased against any particular group or interest.

The research measured effectiveness using surrogate criteria of relevance, legitimacy, and credibility, and found that both complementarities and tensions can exist among these criteria. Managers therefore should be aware of the potential tradeoffs in designing their stakeholder processes. For example, providing interpretation of data in an indicator report may increase the relevance of the report, but decrease its credibility and legitimacy.

DISCUSSION AND CONCLUSIONS

The paper discusses these findings in the context of stakeholder engagement in general, the specific contexts of the six case studies, and the national context of environmental policy-making. The following are preliminary conclusions regarding design choices that may most effectively increase the success of stakeholder engagement initiatives.

- ***Adoption of a Tiered Approach to Stakeholder Engagement:*** The four functions of communication and trust-building, advisory comment, problem-solving, and decision-making are all important aspects of involving stakeholders, and each can have different and often conflicting effects on the effectiveness, relevance, legitimacy, and credibility of participatory processes. Open forums, for example, while enhancing relevance and legitimacy, may reduce a program's credibility. Stakeholder involvement initiatives should therefore seek to incorporate all of these functions in a tiered organizational structure that keeps them separate operationally but connected institutionally. Such an approach can minimize the negative effects of each function while maximizing their benefits.
- ***Promotion of Transparency of Decision-Making Structures and Processes:*** High levels of transparency can increase the legitimacy and credibility of an indicator development process, and reduce accusations of bias and lack of accountability.
- ***Recruitment of a Diversity of High Status Leaders and Participants:*** A stakeholder process that is led by respected individuals in their fields and engages a representative group of stakeholders can be perceived as more legitimate, credible and relevant to the public. A four sector co-chair structure (government, industry, non-profit, academia) that has a rotating executive chair position and an operating culture of consensus-oriented decision-making may therefore be an important design option.
- ***Adoption of an Integrated, Broad-Based Approach:*** Such a strategy can increase the relevance, legitimacy and credibility of the process by ensuring that relevant perspectives, issues and valuable synergies are not ignored.
- ***Engagement of an Independent Facilitator:*** Whether the facilitator is an individual or part of a larger organization, their perceived independence and neutrality may be a critical determinant of the legitimacy and credibility of a process.

The paper also discusses these conclusions in the context of both the six case studies and the possible institutionalization of a national system of environmental indicators. Several ideas relating to a National Bureau of Environmental Statistics that might adopt the same tiered, multi-functional structure suggested above, and include a multi-stakeholder Board of Directors, Environmental Indicators Advisory Committee, Technical Commission on Environmental Indicators, and an Annual Forum on the State of the Nation's Environment. Creation of such a bureau could also be linked to a 100th Anniversary celebration of Theodore Roosevelt's White House Governors' Conference on the Conservation of Natural Resources, which would provide the President with a platform to promote his vision of sound environmental management and stewardship of our nation's natural resources and heritage.

Introduction

The federal government has initiated several attempts to develop indicators regarding the state of the nation's environment, either in a comprehensive set or as subsets regarding specific natural resources. These initiatives were stimulated by a general agreement that a more coordinated environmental monitoring and assessment system is necessary for effective policy-making. As a recent GAO report stated, "There is no generally accepted, comprehensive indicator system for the nation as a whole…The issue of developing key national indicators is important for taking a more comprehensive view of the nation's position and progress, both on an absolute and relative basis."[2] Conflicts over environmental policy at both the local and national levels have provided additional incentives for developing a better understanding of the state of the nation's natural resources.

The development of environmental indicators is central to this task of integrating and improving our relevant knowledge, and a variety of executive agencies and non-governmental organizations are involved with this undertaking. The construction of these indicators, however, may be strongly contested due to their potential ramifications on public policy. The challenge is to design a process of indicator development that is acceptable to a wide range of stakeholders; in terms used by William Clark and David Cash of the Harvard Kennedy School of Government, the process must be "salient," "credible," and "legitimate." In other words, it must be perceived as relevant to policy, technically competent, and fair to competing constituencies.[3] A key factor in meeting these criteria is developing effective mechanisms for involving these constituencies in the development process.

The Council on Environmental Quality (CEQ), which coordinates federal environmental efforts and works closely with agencies and other White House offices in the development of environmental policies and initiatives, has been actively involved with several of the environmental indicator development initiatives that are ongoing in the federal government, and assists in coordinating these efforts across agencies.[4] In 2002, an ***Interagency Working Group on Indicator Coordination*** was formed to develop a Framework for a National System of Indicators. The Working Group's report includes a Vision to "develop the capacity to regularly report on natural and environmental resources and closely related health, social and economic factors using a comprehensive set of indicators, a National System of Indicators on Natural and Environmental Resources."[5] It also suggests several guiding principles:

- Meet the needs of a wide range of uses and users, both private and public;
- Reflect a systems and science-based approach to the selection of indicators and measurements;
- Use data from valid, consistent, science-based measurements;
- Draw upon existing inventorying and monitoring capacities to make the relevant measurements;
- Use new institutional capacities as needed for data compilation, indicator development and production and statistical reporting; and
- Employ up-to-date information technology to reduce the costs of data acquisition, processing and access.

Additionally, the report recommends that institutional arrangements be developed to guide and coordinate system development and implementation, measurement and data acquisition, data compilation and statistical reporting, research, and policy-related analysis and interpretation.

The Working Group is currently working towards completing a National Indicator System Development Plan, which will recommend institutional arrangements to "provide the capacity and ensure collaboration needed to produce and publish indicator information."[6] A key issue is the role of external stakeholders in such an institutional arrangement.[i]

[i] CEQ reports annually to the President on the state of the environment; oversees federal agency implementation of the environmental impact assessment process; and acts as a referee when agencies disagree over the adequacy of such assessments. Ted Heintz, who is coordinating these indicator coordination efforts at CEQ, was the primary contact for this research project, although officials from other agencies provided provide guidance and feedback as well.

This paper therefore addresses this question, and focuses on identifying the most effective ways to involve stakeholders in the development of national environmental indicators. This question fits under the broader question of what is the most effective process for developing a robust set of such indicators, and assumes that some level of stakeholder engagement is a critical component of such a process.

The analysis focuses on six indicator development processes currently underway at the national level, which include:

- The Roundtable on Sustainable Forestry (RSF)
- The Sustainable Minerals Roundtable (SMR)
- The Sustainable Rangelands Roundtable (SRR)
- The Sustainable Water Resources Roundtable (SWRR)
- The H. John Heinz III Center for Science, Economics and the Environment's *State of the Nation's Ecosystems* Report
- The Environmental Protection Agency's (EPA) *Draft Report on the Environment*

The sections below begin with an overview of national environmental indicators in the US and brief introductions to the case studies. Research methods are then described, followed by the key findings from a survey of participants and an analysis of the design factors for each of the six initiatives. In light of these findings, the paper concludes with recommendations on improving these initiatives and designing stakeholder engagement processes for a national system of environmental indicators.

Context and Background

THE NEED AND DEMAND FOR NATIONAL ENVIRONMENTAL INDICATORS

Economic Parallels: In 2000, the Department of Commerce recognized the Gross Domestic Product (GDP) as the "mainstay of modern microeconomic analysis" and its greatest achievement of the 20th century.[7] Senator Pete Domenici, Chair of the Senate Budget Committee, stated at the time that "the ability to measure our economy accurately is absolutely critical in the formulation of the federal budget," and Alan Greenspan, Chair of the Federal Reserve, said "it's a crucially important statistic to get a sense of where the overall economy is and where it has been."

At the same time, Chairman Greenspan recognized the limitations of the GDP, saying that:

> It is not necessarily a measure of welfare or even a significant measure of standards of living. I think we're all acutely aware of the fact that, for example, there are a number of southern states that use a huge amount of air conditioning in the summer and that appears as output in the GDP. The wonderful breezes you get up in northern Vermont during the summer, which eliminates the requirement for air conditioning, doesn't show up in the GDP. And other things equal, the standards of living are the same, but the GDP will be less in Vermont than it will be in the South, and clearly that is not a measure of welfare.[8]

A more accurate measure of welfare must therefore take into account environmental quality, and many have called for statistics similar to the GDP and national accounts that relate to the state of the nation's environment. In the early 1990s, the Bureau of Economic Analysis (BEA) explored setting up "Green GDP" satellite accounts to take into account natural resource depletion and changes in environmental quality, but these efforts were delayed by Congress in 1994 because of concern about the technical credibility and political implications of the proposed adjustments.[9]

Improving and Integrating Environmental Information: Concurrently, others were focused on improving the environmental data that could undergird such accounts and guide national environmental policy as BEA's economic statistics guide economic policy. In 1997, The National Science and

Technology Council concluded that "a fundamental improvement in the way that the United States monitors its environment is required…Current monitoring programs do not provide integrated data across multiple natural resources at the various temporal and spatial scales needed to develop policies based on current scientific understanding of ecosystem processes."[10] This report led to the National Research Council's 1999 study, "Ecological Indicators for the Nation," which reiterated the call for better integration of environmental data.

Federal and Academic Interest: The 1990s witnessed such calls for more integrated environmental monitoring and management across a range of natural resources arenas. The National Research Council produced a book on "Rangeland Health" that called for a "standard method and common data base for evaluating rangelands…that everyone can understand and use to make decisions about use and management of and investment in our rangeland resources."[11] Jack Ward Thomas, the first biologist to become chief of The US Forest Service, oriented the agency towards the increasingly popular concept of ecosystem management, which he defined as "a holistic approach to natural resource management…that steps back from the forest stand and focuses on the forest landscape and its position in the larger environment."[12] The concepts of ecosystem health and integrity also became more widely used, as James Karr's Index of Biotic Integrity was adapted by state governments and the Environmental Protection Agency as an important measure of watershed quality.[13] The adoption of these new concepts and approaches represented a convergence of thinking between researchers and resource managers, both of whom recognized the limitations of traditional stovepipe approaches and were demanding higher quality, more integrated and more accessible environmental data across a range of media.

State and Local Activities: Meanwhile, state and local interest in understanding the condition of the environment blossomed as well. A 2004 GAO Report, "Informing the Nation: Improving How to Understand and Assess the Nation's Position and Progress," stated that "comprehensive key indicator systems are active, diverse, and evolving" and "individuals and institutions from local, state, and regional levels across the United States…have comprehensive key indicator systems to better inform themselves." Many local communities have developed indicators to monitor their local environmental quality, and many states have produced comprehensive State of the Environment reports.[14]

International Initiatives: In addition, many environmental monitoring initiatives grew out of the 1992 Earth Summit (UN Conference on Environment and Development) in Rio de Janiero, including the Global Environment Outlook (GEO) Project[15] and the Montreal Process, an initiative including 12 countries to develop criteria and indicators to assess the state of boreal and temperate forests.[16] The Johannesburg World Summit on Sustainable Development (WSSD) in 2002 provided new impetus for measuring the state of the environment, and stimulated the selection of an experimental set of indicators by a federal Interagency Working Group on Sustainable Development Indicators.[17]

GAO and the National Academies: The Key National Indicators Initiative: These various developments, from the Green GDP to community indicator initiatives, demonstrate an increased interest in and demand for measures of environmental quality coming from a diverse spectrum of sectors and scales of society. Such demand is being reflected at the national level in two parallel initiatives, the Key National Indicators Initiative (KNII) and the Council on Environmental Quality's Interagency Working Group on Indicator Coordination. The KNII is a project that evolved out of a Forum on Key National Indicators convened by GAO in cooperation with the National Academy of Sciences. This Forum explored the need for a comprehensive set of indicators that "can help to assess the overall position and progress of our nation in key areas, frame strategic issues, support public choices and enhance accountability."[18] The Forum led to the establishment of a National Coordinating Committee for the initiative that includes such diverse organizations as the National League of Cities, Private Sector Council, Association of American Universities, the National Academies, and the Heritage Foundation. The Initiative, which is currently housed in the National Academies and chaired by former Harvard University President Derek Bok, has received significant funding and is currently exploring options for selecting and institutionalizing such an indicator set.[19]

The CEQ Interagency Working Group on Indicator Coordination: The CEQ Interagency Working Group on Indicator Coordination was established in 2002 and consists of representatives from all the

federal departments involved with environmental data management (Agriculture, Commerce, Defense, Health and Human Services, Interior, and Transportation, EPA, and the White House Offices of the Federal Environmental Executive, Management and Budget, and Science and Technology Policy). It has been tasked with coordinating and integrating "federal investment in environmental indicator sets."[20] It is connected with an Integration and Synthesis Group that is developing a conceptual model that will enable more systematic thinking about the structure of such a comprehensive set of national environmental indicators.

An Integration of Efforts: Leaders of both the CEQ and KNI initiatives are currently working to coordinate their projects and create valuable synergies between them. Plans for next steps toward more concrete indicator institutionalization are expected by the end of 2005, and so significant momentum exists toward developing the foundations for more informed environmental policy-making.

OBSTACLES TO DEVELOPING NATIONAL ENVIRONMENTAL INDICATORS

Substantial obstacles remain, however. GAO's report, *"Environmental Indicators: Better Coordination is Needed to Develop Environmental Indicator Sets that Inform Decisions,"* identifies four primary challenges to developing such indicators:

- Ensuring that a sound process is used to develop the indicator sets
- Obtaining sufficient environmental data to report conditions and trends related to the indicators selected
- Coordinating and integrating various related indicator sets in order to obtain a better understanding of the environment
- Coordinating specific environmental management actions and program activities to changes in environmental conditions and trends[21]

The underlying causes of these challenges can be classified as institutional, political, ideological, informational, and financial, and are explored below.

Institutional Obstacles: As the GAO report states, "the federal government lacks an organizational framework or institutional arrangements to provide a consistent basis for working with international, state, and nongovernmental indicator initiatives." Furthermore, they lack internal coordination due to the historical context of the executive branch. Different departments were created and expanded to address the needs of particular constituencies and the issues of a particular time, and independently developed their statistical tools to serve their ends.[22] Thus the federal government has 70 agencies that spend at least $500,000 annually on statistical activities.[23] These agencies all have a vested interest in maintaining their autonomy and orienting their data to fulfill their particular missions. Integrating and coordinating initiatives will generally be seen as a threat, and will be resisted overtly if possible and covertly if necessary.

Political Obstacles: The environment has become a partisan and divisive issue in the current political climate. Both parties are being drawn to the extremes of the ideological spectrum, from Michael Berliner of the Ayn Rand Institute, who declares "there is a grave danger facing mankind…Environmentalism…A more malevolent, man-hating philosophy is unimaginable,"[24] to Dave Forman, the founder of Earth First!, who asserts that environmentalists should have no "desire to gain credibility or 'legitimacy' with the gang of thugs running human civilization…They are madmen destroying the pure and beautiful."[25] Whether it is the Arctic National Wildlife Refuge, global climate change, or forest fires on public lands, the parties are often bitterly divided on environmental issues and have difficulty compromising with each other.

Furthermore, sectoral interests often take strong defensive postures, as industry tries to protect its profits, state and local governments try to fight unfunded mandates, and the non-profit sector tries to defend their particular interests. If a significant number of these "stakeholders" are left out of the process of developing these indicators and believe that it is biased and unfair to their interests, they will resist their implementation. Since indicators do not have the glamour or urgency of other issues that attracts broad

public support and concern, individual interest groups can more easily halt their development if they see them as illegitimate. This is one of the lessons from the green GDP experience, as Congressmen from coal-producing states almost single-handedly stopped its implementation. In such a climate, the potential for environmental indicators being politicized and attacked by either side—as an excuse for more research and less action or a justification for unfounded doomsday predictions—is strong. Even absent such attacks, the complexity of institutionalizing these indicators demands bipartisan support and action that will be difficult to achieve under the current circumstances.

Ideological Obstacles: Beyond mere political winds and stances, profound differences in ideology and values are often at the core of environmental controversies. Deep moral conflicts over the primacy of future vs. current generations, human vs. non-human species, local control vs. national considerations, or considerations of equity vs. efficiency often underlie these controversies. Some believe that there are things that are priceless and have a dignity that cannot be measured, while others believe everything has a value that can be priced and compared. These conflicts have the potential to impact environmental indicator initiatives if they are perceived as threatening these core values or biased against one particular ideology. Because these values are often viewed in absolute terms, the intensity of resistance may be quite strong, especially because of the capacity of environmental indicators to have long-term impacts on policy-making.[26]

Informational Obstacles: Availability of accurate information and data sets to populate a set of environmental indicators may be extremely limited. Because most US environmental data is collected below the national level—the Environmental Council of States calculates that 94% of the data in six of EPA's databases was provided by the states[27]—significant differences in definitions and methodologies exist that make comparability difficult. For example, a GAO Report on Water Quality concluded that "the approaches used to identify impaired waters varies considerably among states" because of different water quality standards, types of monitoring practices, listing procedures, and guidance from EPA regional offices.[28] In general, data may be available but not processed and analyzed, not available in a form that is currently useable because of comparability issues, or not collected but could be if adequately funded.[29] Such information gaps are closely linked to the narrow institutional compartmentalization mentioned above, which enables important monitoring needs to fall through the cracks. It is also linked to the financial obstacles.

Financial Obstacles*:* Because of the institutional stove-piping of environmental agencies, no one agency exists that is in charge of keeping track of the state of the nation's environment in a holistic and integrated fashion. While the Council on Environmental Quality is charged by Congress to keep track of important environmental data at the federal level, it is no longer required to publish an annual report and does not have the staff or budget to do so. Actual data collection, analysis and reporting is completed in separate agencies where broader regulatory and management activities often have precedence over monitoring. Thus the availability of funding for monitoring, let alone the development of environmental indicators, is severely limited. The challenges at the state level, where much of the data collection actually occurs, are even more intense. Nevertheless, approximately $600 million is spent annually on environmental monitoring, and so some resources are available. In this context, the challenge is directing those funds to the highest information priorities and eliminating unnecessary redundancy between monitoring programs, which can also be difficult because of the institutional obstacles discussed above.

OPPORTUNITIES FOR DEVELOPING NATIONAL ENVIRONMENTAL INDICATORS

A Groundswell around Collaboration: Despite the many obstacles facing the development of national environmental indicators, significant opportunities exist as well. In addition to the momentum being created by the CEQ and KNI initiatives, the environmental indicators effort can benefit significantly from a broader groundswell of ideological, political, and institutional currents centering around the concept of collaborative resource management. This groundswell is resisting the polarization around environmental issues that many people view as artificial and counter-productive. As politics in Washington have become more partisan, partnerships at the local level that bridge traditional divides have been increasing. The Conservation Technology Information Center, for example, has identified 958 watershed partnerships between public and private entities across the country that have emerged over the past four decades.[30]

This trend has been driven by concrete examples, such as the Quincy Library Group,[31] and innovative theoretical frameworks such as Michael Leavitt's *enlibra* principle of balance.[32] After years of paralysis due to lawsuits and political battles, many people have been searching for a better way that is more effective and respectful. As one Forest Service District Ranger put it succinctly, cooperation is "just necessary. We have to cooperate to do our jobs properly."[33] An environmentalist concurred, saying "it was desperation and gridlock that brought us together, but it is trust and respect that keep us going."[34]

Presidential and Administration Support: The Bush administration has focused on such cooperative conservation as a hallmark of its environmental policy, and the President signed an Executive Order in 2004 encouraging more such collaboration across all relevant agencies.[35] Secretary of Interior Gail Norton has stated that "The power of partnership produces results for conservation that far exceed the dollars we put into these partnerships," and her department's FY2005 proposed budget for cooperative conservation programs is over $500 million.[36]

Building on Alternative Dispute Resolution: Meanwhile, the concept of alternative dispute resolution has become increasingly applied to the environmental field. Congress passed the Administrative Dispute Resolution Act and Negotiated Rulemaking Act in 1990, which enabled and required federal agencies to pursue alternatives to litigation.[37] By 1999, the EPA was dedicating $41 million annually to contract for facilitators, conveners, and mediators in the resolution of environmental disputes.[38] Increasingly, agencies are viewing themselves as mediators of conflicts rather than as only enforcers of the "law." The Bureau of Land Management's vision statement for alternative dispute resolution, for instance, states that the agency "will value resolving issues and disputes through alternative dispute resolution philosophies and processes rather than through confrontation, appeals or litigation."[39]

A Need for Cooperation: This interest in partnerships and alternative dispute resolution stems from a knowledge of the political, ideological, and institutional obstacles described above and a recognition that a willingness to cooperate with diverse interests is the only way to get things done. The same may be true for the task of environmental indicators, which can be as equally contentious as other environmental subjects. Indeed, a lack of sufficient collaboration may explain why a national environmental indicator system has yet to be established, even though CEQ called for "better information…to evaluate the condition of the Nation's environment" as early as 1970.[40]

Promises and Pitfalls: Indeed, many people have come to this realization, and have initiated several parallel efforts at developing such indicators that embrace a more cooperative partnership-based approach. These initiatives, six of which are examined in this paper, appear to be quite promising, but it is important to keep in mind the pitfalls and problems associated with collaboration. As Coughlin et al. (1998) summarizes, "concerns range from condemnation of alternative dispute resolution as a tactic to delegitimize conflict and co-opt environmental advocates, to uncertainty over local control of national resources and the scientific soundness of negotiated agreements."[41] Critics complain that collaboration encourages shirking of government responsibilities, capture of agencies by special interests, co-optation, lowest common denominator solutions, complacency, and compromising of federal laws, all of which may be important issues. In analyzing these cases, this paper will explore the important choices in designing stakeholder involvement processes that most effectively maximize the benefits of collaboration while minimizing its costs.

The Case Studies: Origins and Status

All of the six case studies have unique histories and operate within different contexts. This section includes brief overviews of the origins and status of each initiative, while later sections include a more extensive discussion of the differences among the cases related to stakeholder participation.

ROUNDTABLE ON SUSTAINABLE FORESTS (RSF)

The Roundtable on Sustainable Forests (RSF) was officially established in 1999, making it the first of the four roundtables. It grew out of nearly a decade of domestic and international dialogue on the broad goal of sustainable forest management, and is closely linked to the Montreal Process, an international agreement on the development and implementation of criteria and indicators (C&I) for "the conservation and sustainable management of temperate and boreal forests." The process involves 12 countries, including Argentina, Australia, Canada, Chile, China, Japan, South Korea, Mexico, New Zealand, Russia, the US, and Uruguay, which represent 60% of the world's forests and 90% of the world's temperate and boreal forests. In 1997, the member countries collectively produced a set of "First Approximation Reports" that focus on seven criteria and 67 indicators of sustainable forest management.[42]

In 1998, a letter was sent to the Council on Environmental Quality and Office of Management and Budget by six private sector and non-governmental organizations, including the National Association of State Foresters, Global Forest Policy Project, American Forest and Paper Association, National Audubon Society, Society of American Foresters, and World Wildlife Fund, urging cooperation among federal agencies in data collection and more collaboration with external stakeholders. This letter led to the convening of the "Chief's Roundtable," which was attended by the Secretary of Agriculture, the Chief of the Forest Service, and other executives from both governmental and non-governmental organizations, which became the Roundtable on Sustainable Forests (RSF). The RSF held its first meeting in September 1998, and has been primarily supported by the US Forest Service. The primary focus of the RSF has been providing feedback and assistance to the Forest Service on the completion of its 2003 Report on Sustainable Forests, which summarizes and interprets available data for the 67 indicators from the Montreal Process. The RSF is currently facilitating feedback on those indicators from stakeholders to inform the US government's position on refining the Montreal Process C&I at the next international Working Group Meeting.[43]

SUSTAINABLE MINERALS ROUNDTABLE (SMR)

Building on the model of the RSF, the Sustainable Minerals Roundtable (SMR) became the second roundtable to be formed in June 1999. It is co-chaired by the US Forest Service and the US Geological Survey, and convened by the University of Nevada's Mining Cycle Center in Reno. The mission of the Roundtable is to "support the nation's commitment to sustainable development" and to "develop indicators of sustainability, based on social, economic, and environmental factors, to provide a means for assessing the status and trends of minerals/materials and energy systems."[44] Early participants in the SMR, who included representatives from industry, government, academia, and environmental organizations, agreed to use the Montreal Process C&I as a starting point for their work, and then determined that only four of the seven criteria were applicable to energy and mineral resources.

In the first phase of the SMR, debate focused on whether the sustainability concept was applicable to a non-renewable resource such as minerals, and the nature and history of mining provoked animosity and suspicion from both the conservation and industry participants. The controversy reached a point where many in the environmental community concluded they could not participate in the process because they viewed it as endorsing the mining industry. Participation then dropped off, but a smaller group of stakeholders remained involved and focused on identifying and prioritizing indicators according to an agreed-upon set of indicators. Funding has been somewhat limited for continuing the work of the SMR, but a First Approximation Report is expected in the spring of 2005.[45]

THE SUSTAINABLE RANGELANDS ROUNDTABLE (SRR)

The Sustainable Rangelands Roundtable (SRR) grew out of discussions sparked by Kendall Johnson, First Vice President of the Society for Range Management, regarding the inclusion of rangelands in the Roundtable on Sustainable Forests. The RSF decided to focus on forests, but promoted the idea of a separate, but parallel, effort on rangelands. In April 1999, the Forest Service Director of Range Management convened a workshop on rangeland sustainability in Denver to gauge stakeholder interest in such a parallel process, and the consensus was to promote such an effort. The first meeting of the Sustainable Rangelands Roundtable was held two years later in April 2001, and has convened its

meetings around the country. The SRR issued a First Approximation Report on Criteria and Indicators for Rangelands in May 2003, which adopted five of the seven Montreal criteria and changed many of its indicators to relate more directly to rangelands. It has been jointly funded by the US Forest Service, Bureau of Land Management, and US Geological Survey, and convened by Colorado State University. The SRR is currently discussing mechanisms to promote the completion of a Report on Sustainable Rangelands by 2010 that would be similar to the US Forest Service's 2003 Report on Sustainable Forests.[46]

THE SUSTAINABLE WATER RESOURCES ROUNDTABLE (SWRR)

The idea of a Sustainable Water Resources Roundtable (SWRR) originated at the March 2001 meeting of the Interagency Working Group on Sustainable Development Indicators, which was chaired by David Berry from the US Geological Survey. Several people at the meeting followed up on the concept, and after retiring, both David Berry and Tim Smith (USGS) became involved with managing and coordinating the process, respectively. They proposed that the Roundtable become a subgroup of the existing Advisory Committee on Water Information, an inter-agency initiative that operates under the Federal Advisory Committee Act (FACA), and in 2002 the terms of reference for the roundtable as such a sub-committee were approved and the first meeting was held in December 2002 in Alexandria, VA. The SWRR is supported by a wide range of organizations, including the US Forest Service, US Geological Survey, EPA, Natural Resources Conservation Service, Bureau of Land Management, the Department of Energy, and the Electric Power Research Institute. The group is currently in the process of drafting a report on water resource indicators that summarize the discussions of the SWRR thus far, and will focus on the three categories of ecology, economy, and society.[47]

THE HEINZ CENTER'S STATE OF THE NATION'S ECOSYSTEMS REPORT

The State of the Nation's Ecosystem's project began as a recommendation from a 1995-1996 federal interagency review, the National Environmental Monitoring Initiative, which concluded there was no existing mechanism for selecting and reporting a set of high level ecosystem indicators for the nation. Following up on this recommendation, the White House Office of Science and Technology Policy contracted The Heinz Center for Science, Economics, and the Environment to "create a non-partisan, scientifically grounded report on the state of the nations' environment."[48] The Heinz Center received funding from nine government agencies and six private sources to undertake this initiative,[ii] and recruited experts from industry, environmental organizations, universities, and government agencies to serve on a 23-person Design Committee and six Working Groups consisting of 10-14 people. These Working Groups focused on developing and populating indicators for six ecosystem types (coasts and oceans, farmlands, freshwaters, grasslands and shrublands, freshwaters and urban and suburban areas).

The Center also recruited a group of Senior Advisors from multiple sectors, including the Vice President of International Paper, the President of National Audubon Society, the President of Carnegie Mellon University, and a Congressman from New Jersey, among others. William Clark, a Professor at the Kennedy School of Government and a member of the Heinz Center Board, serves as Chair of the Design Committee.[iii] A prototype report for three of the ecosystem types was released in 1999, and was revised

[ii] ***Federal agencies*** that supported the Heinz Center report included the Department of Agriculture, the Department of Defense, the Department of Energy, the Department of the Interior, the Environmental Protection Agency, the Federal Emergency Management Agency, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and the National Science Foundation. ***Corporations and foundations*** that provided support included Chevron Company, Cleveland Foundation Special Fund No. 6, Foundation for Environmental Research, John Deere & Company, Electric Power Research Institute, Georgia-Pacific Corporation, Vira I. Heinz Foundation, Andrew W. Mellon Foundation, Richard King Mellon Foundation, Charles Stewart Mott Foundation, David and Lucile Packard Foundation, Procter & Gamble Company, and Royal Caribbean Cruise Lines.

[iii] In addition to being Chair of the Heinz Center's Design Committee and an architect of the report's process, it should be noted that Professor Clark is also the Faculty Advisor for this report, which is being completed in partial fulfillment of the requirements for a Master in Public Policy from the Kennedy School. Some of the conceptual frameworks used in the analysis are also adapted from the work of Professor Clark and others on social learning and knowledge systems (Cash et al. 2004). Every effort has been made on the parts of both the author and Professor Clark to keep these different roles separate to ensure an objective and unbiased analysis.

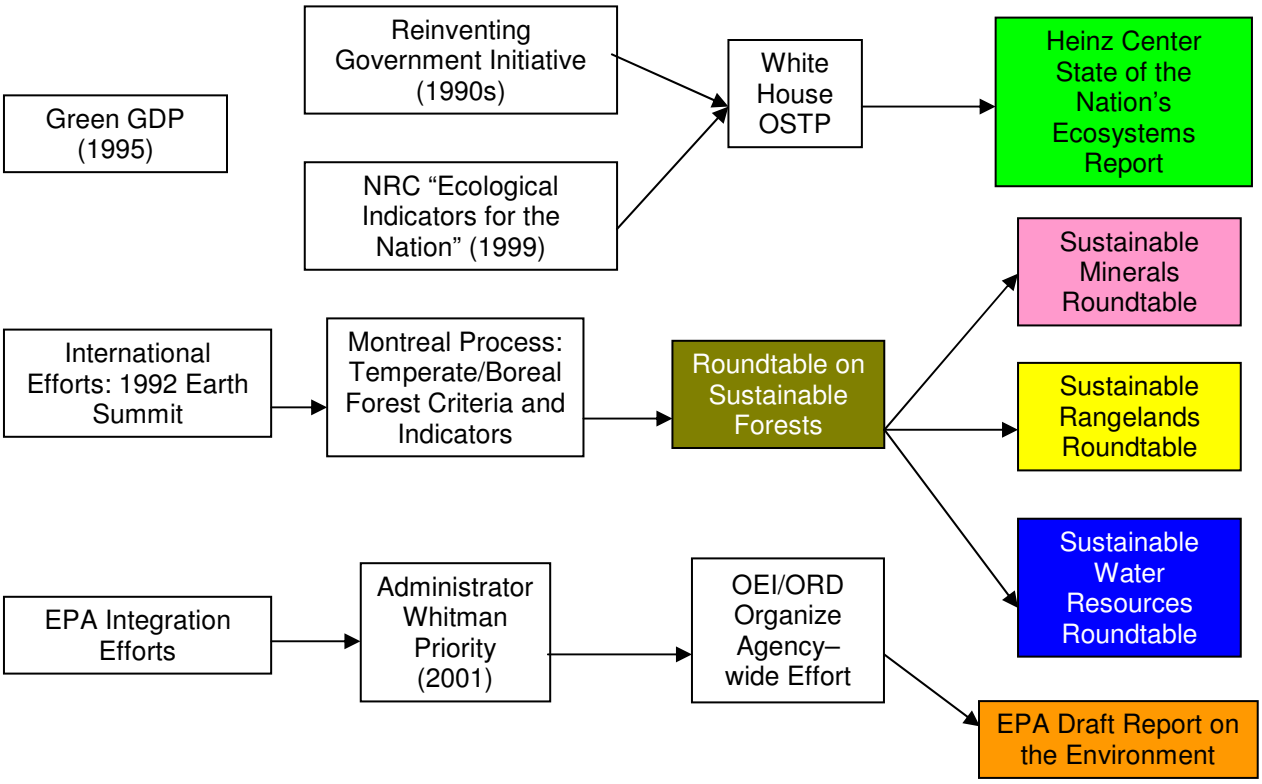
significantly in response to comments. The final report, *The State of the Nation's Ecosystems,* was published in 2002 and includes all six ecosystem types. The Heinz Center is currently working on the report's second edition, which will fill many of the data gaps of the first edition and will be published in 2007.[49]

EPA DRAFT REPORT ON THE ENVIRONMENT

The Environmental Protection Agency has considered creating a comprehensive report on the environment for over a decade, with at least four specific attempts that were not completed in the 1990s. The primary reason these initiatives failed was the difficulty of transcending the EPA's specialized medium-based organizational structure that has separate divisions focused on Water, Air and Radiation, Prevention, Pesticides and Toxic Substances, and Solid Waste and Emergency Response. In 2001, Administrator Christine Todd Whitman made an integrated report a priority of her tenure, and directed the Office of Environmental Information (OEI) and Office of Research and Development (ORD) to jointly develop such a report, in collaboration with staff from across the agency. OEI was responsible for producing a Public Report for decision-makers and the public while ORD was tasked with producing a Technical Report for a scientific audience. A Steering Committee and Technical Working Committee were formed, and outside contractors were contracted work with agency staff in researching and writing the report.

While primarily an internal agency process, more than half of the data came from sources outside EPA. ORD held two review workshops with outside experts and OEI convened two workshops to engage state and local practitioners. The process went through five drafts, the third of which was presented to CEQ, OMB, and other agencies for comment. Some controversy existed around the climate change chapter, which was left out of the final draft. After the report was published in June of 2003, a National Dialogue process was convened to solicit comments from stakeholder groups on the report's form, function, and process. The Dialogue was held in the context of six workshops of approximately 30 people each in cities around the country, and ended with a national webcast of EPA officials answering questions about the report in Washington, DC. The agency is currently working on a second edition of the Report to be published in 2006, and is developing a strategy to involve stakeholders more effectively.[50]

Figure 1 Origins of the Case Studies



Research Methods

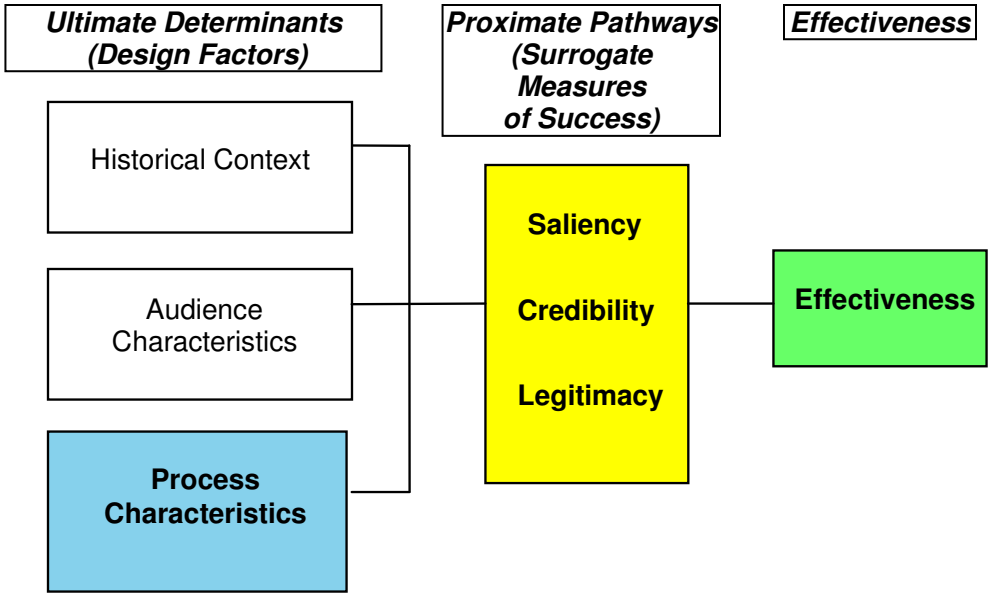
ANALYTICAL FRAMEWORKS

The methodology used to research these questions is based on several different conceptual frameworks related to public participation in policy-making. Archon Fung's (2003) typology of institutional design choices for public spheres, which comes out of the field of deliberative democracy and demonstrates the complex heterogeneity of "minipublics," is adapted to the context of stakeholder involvement in indicator development processes.[51] His emphasis on the effects of different goals and the importance of deliberative modes, stakes, and empowerment is particularly relevant to this context. While Fung's work was helpful in categorize the design variables going into these processes, Rowe and Frewer's (2004) analysis of public participation evaluation studies was useful in understanding the many different ways to measure the effectiveness of these processes.[52]

This paper adapts Cash et al.'s (2002) framework of using three criteria—saliency, legitimacy, and credibility—as surrogate measures for effectiveness in light of the fact that direct assessments are not possible for processes that are on-going and designed to have effects far into the future.[53] The authors also distinguish between three sets of factors that are most likely to influence both the surrogate criteria and effectiveness: historical context, characteristics of audience, and characteristics of the process itself (6). While the first two areas are touched on in the background section above, this paper focuses on the factors related to process design. This framework is illustrated in the figure below, and explained in more detail below.

Figure 2: Analytical Framework[54]

What Properties of Stakeholder Processes Make Them Effective?



Maguire and Lind's (2003) application of concepts of procedural justice from social psychology provides further detail and depth on aspects of the legitimacy criteria and the design factors that affect it.[55] Their criteria relating to voice, fairness of the process, and behavior of the facilitator are particularly applicable. Finally, Innes' (1990) classification of the indicator development process in the context of relating knowledge to public policy is also relevant to the questions of this paper. She categorizes the development and use of indicators into six primary components, and discusses the value of involving different types of participants in each of these phases. Thus a typology for understanding the impacts of stakeholders on indicator development is possible:

- *Concept Creation:* What are the stakeholder effects on initial models and objectives?
- *Data Collection:* What are the stakeholder effects on collection methods and population choice?
- *Data Structure:* What are the stakeholder effects on indicator criteria and organization?
- *Indicator Institutionalization:* What are the stakeholder effects of making indicators semi-permanent?
- *Indicator Usage:* What are the stakeholder effects on policy-making?
- *Indicator Politics*: What are the stakeholder effects on the reputation of indicators?[56]

RESEARCH COMPONENTS

These conceptual frameworks guided the formulation of the research strategy for this policy analysis. The research methodology included eight major components:

Literature and Document Review: Existing documents relating to the six case studies, including official reports, meeting minutes, and reviews, were surveyed. In addition to the five overarching analytical frameworks described above, the fields of joint-fact finding, deliberative democracy, collaborative management, and environmental conflict resolution were also surveyed for useful concepts relating to indicators and stakeholders.

Hypothesis Development: Key design variables to investigate in the course of the project were identified that are most likely to influence the success of the initiatives, and specific hypotheses were developed about the impact of those variables on process effectiveness, credibility, saliency, and legitimacy.

Leadership and Participant Semi-Structured Interviews: In-person and phone interviews with the co-chairs, facilitators, and a representative sample of participants were conducted to develop a better understanding of the processes and participant impressions of their effectiveness. A total of 40 people were interviewed and included at least one representative from industry, government, the non-profit sector, and academia for each initiative (with the exception of EPA and SMR).[iv] The co-chairs, facilitators, and coordinators of each process were also interviewed (See Appendix A for complete list of interviewees).

Meeting Observation: Meetings of several of the initiatives (Roundtable on Sustainable Forests and Sustainable Water Resources Roundtable in Washington, DC and Sustainable Rangelands Roundtable in St. Louis) were attended and observed, and informal conversations with meeting participants were held.

Analysis of Participation Patterns: For three of the six initiatives, participation patterns of 12 different organizational types and five sector categories were analyzed. Where data was available, trends in attendance frequency by different stakeholder groups were also examined.

Online Participant Survey: In order to get a broader and more systematic understanding of participant's perspectives on each process, a brief online survey was distributed to participants in five of the six initiatives.[v] The questions focused on the effectiveness, credibility, relevance, and legitimacy of each process.

[iv] Contact information was not available for representatives from some of the sectors for these two cases.
[v] The coordinators of both the SMR and SRR did not send out the survey, but invitations were sent independently to 17 SRR participants who participated in the St. Louis Roundtable meeting (13 responded).

Analysis of Survey Data and Design Variables: A typology of design factors was created and used to analyze the design decisions made by each initiative. The design variables were compared to the results of the survey to assess any trends or correlations between particular design choices and participant perceptions. Statistical analysis was conducted to identify significant differences among the survey responses.

Recommendations: Based on the results of the research, policy recommendations for future iterations for each initiative were developed. Recommendations on the engagement of stakeholders in a new institution focused on key national indicators were also considered.

A comparative approach was used to take advantage of CEQ's position as a facilitator and bridge between these processes, and build on research already done on individual programs.[vi] A broad-based and systematic evaluation of these perspectives using the same methods and set of criteria allows both CEQ and relevant agencies to identify differences between the initiatives as well as opportunities to learn from their experiences.

Key Findings from the Four Roundtables, EPA, and Heinz Center Initiatives

A Framework for Measuring "Effectiveness"

Before the effectiveness of these initiatives can be assessed, a cogent definition of the concept of effectiveness is necessary. As Rowe and Frewer state, "unless there is a clear definition of what it means for a participation exercise to be effective, there will be no theoretical benchmark against which performance may be assessed. Among the possible standards are the speed at which the group came to its solution, the number of ideas generated, the quality of the ideas generated, and the extent to which the final solution represented group consensus."[57] It is also dependent on the goals and objectives of the particular projects themselves, which in the case of these six case studies both overlap and differ in important ways. Some are more oriented towards efficiency and producing an output, while others are more oriented towards building trust and involving as broad a cross-section of stakeholders as possible.

While recognizing the diversity and multiplicity of each initiative's goals, this paper will define effectiveness as the "degree of success at accomplishing the goal of establishing a robust set of national environmental indicators." CEQ is currently focused on this ultimate end, and is interested in learning about the ways in which the initiatives have made progress toward this goal. This is not to say the other goals are unimportant, only that they are beyond the scope of this paper. In this narrow context, these other goals are only relevant if they are perceived as an important means to establishing a robust set of environmental indicators.

Another issue is that all of these initiatives are ongoing, and several have not yet completed a written document outlining their indicator sets. The project of establishing such a set of indicators will take years to accomplish, and is very much a work-in-progress for all of the resources under consideration. Thus directly measuring effectiveness is quite difficult, and as Cash et al., measures of the quality of these ongoing processes themselves are needed as surrogates for effectiveness. They outline three such measures:

- ***Salience***: "The relevance of information for an actor's decision choices, or for the choices that affect a given stakeholder."
- ***Credibility:*** The perception of "information as meeting standards of scientific plausibility and technical adequacy."

[vi] Focused studies of some of these processes have already been completed, such as a report on "Participant Perceptions of Regional Workshops on Sustainable Forests" and a "Summary Report of the National Dialogue on the EPA Draft Report on the Environment 2003." These reports have greatly informed this report and enabled it to take a broader perspective.

- ***Legitimacy:*** The perception of the process as "unbiased and meeting standards of political and procedural fairness."[58]

They make three further points about the nature of these criteria. First, the authors state that "efforts to connect knowledge to action are effective only if they are sufficiently salient, credible, AND legitimate with multiple audiences simultaneously."[59] Each criterion has certain ***"threshold levels"*** that must be reached in order for these knowledge production systems to be effective.

Secondly, they point out that ***interactions between these three attributes can create both tensions and complementarities.*** A process that is asking relevant questions may lose scientific credibility if it appears to be politically biased. A highly credible but isolated process, on the other hand, may be out of touch from practical and relevant issues. A process that involves multitudes of stakeholders may be highly relevant but lose legitimacy if some of the participants are deemed illegitimate by others. On the other hand, increasing the number of participants beyond a select few can increase legitimacy as well. These interactions can work both ways and must be analyzed on a case by case basis (see Appendix B for a diagram of these potential interactions).

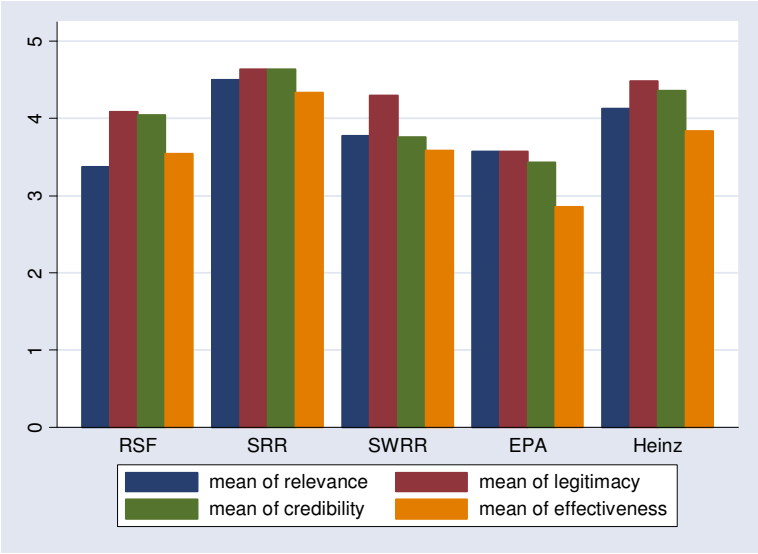
Their third point is about ***tradeoffs:*** "We find that the most successful efforts…are also effective at balancing tradeoffs among these three attributes such that none of the three attributes falls below thresholds that will trigger the rejection of information or the resistance to recommended action."[60]
This paper adopts this framework for analyzing the effectiveness of the six cases, and utilizes four different lenses to estimate the relevance, credibility, legitimacy and overall effectiveness of each.[vii] Background research, direct observation, interviews and written survey responses from participants, and ratings of each criterion by participants in an online survey all provide unique vantage points on the success of these cases thus far. The complexity and diversity of these cases and their different contexts makes such a comparative assessment quite difficult, and this paper's results and conclusions should be viewed with a full appreciation of the contingency of this knowledge. However, recognizing that all policymakers are operating under some level of uncertainty, it is hoped that this analysis, by making use of a variety of methods and perspectives, will improve understanding of these processes and provide useful insights. In the section below, the results from one of these methods, the participant survey, will be presented, and then discussed in light of results from other perspectives.

KEY EFFECTIVENESS FINDINGS

Participant Survey Results: The total number of respondents to the online survey distributed to participants of five of the six initiatives was 105, including 103 useable responses. Participants were asked to rank the process they had participated in on a five-point scale for four criteria: effectiveness, relevance, legitimacy, and credibility. Questions about organizational affiliation and meeting attendance were also included, as were open-ended questions about ways to improve the process for each criteria were included (survey format and written responses are included in Appendix C and Appendix D). Participation was strongest for the SWRR (33 responses), RSF (26), and Heinz (25), and weakest for SRR (12) and EPA (7).

[vii] "Relevance" is substituted for "salience" in this analysis.

Figure 3: Criteria Means across Initiatives



The chart above summarizes the means for each criterion across the five cases. SRR and Heinz had the highest effectiveness means, followed by SWRR and RSF, and then EPA. Relevance means were highest for SRR, Heinz and SWRR, followed by RSF and EPA, and then RSF and EPA. SRR, Heinz, SWRR, RSF had similar legitimacy scores, with EPA slightly lower. Credibility means were highest for SRR and Heinz, followed by SWRR, RSF, SRR, and EPA.

While the mean is a useful summary statistic, it can mask more nuanced differences among the initiative rankings. It may also not capture the "average" perception of the participants because the data is ordinal and may not be "evenly spaced" in respondent's minds. This chart also does not show differences in means among sectors for each case. For more detailed analysis of the survey results, see the Survey Analysis in Appendix E.

While keeping in mind these issues, statistical analysis[viii] was used to analyze the differences in the means and cluster the initiatives by their similarities in score. The results of this analysis are shown in Table 1:

Table 1: Grouping of Programs by Criteria
(Based on Survey Results)

Average Ranking	Effectiveness	Relevance	Legitimacy	Credibility
5: ***Highly***	SRR, Heinz			
4: ***Generally***	SWRR, RSF	SRR, Heinz, SWRR	SRR, Heinz, SWRR, RSF	SRR, Heinz
3: ***Somewhat***	EPA	RSF, EPA	EPA	SWRR, RSF, EPA
2: ***Generally Not***				
1: ***Highly Not***				

Important Caveats: While the survey results and the associated clusters presented above provide an interesting perspective on the cases, significant caveats about them must be kept in mind. Sample size was small for several of the cases, the questions differed slightly among the cases, and the surveys were only sent to participants or people somehow on related email lists, and not to non-participants.

[viii] Analysis included multi-variate regressions and Wald tests; see the appendix for the results and an explanation of the methodology. Ambiguity in a few of the results required some estimation regarding the proper grouping.

Participant's understanding of each criterion may also differ systematically by the culture and goals of each process. Finally, no survey was initiated for the SMR, and so any comparison of that case must be based on other sources. For more detailed discussion of these caveats, see Appendix E.

Assessing Effectiveness: These cautionary notes highlight the need to consider refining our assessment with information from other sources. In the sections below, the survey clusters will be discussed in light of the survey written responses, participant interviews, and the context of each case.

It is also important to point out that none of the cases were on average ranked "ineffective." Thus differences among the initiatives are all in the range of "somewhat effective" to "highly effective," and this is the case for the other criteria as well.

In light of this caveat, SRR ranked relatively highly and EPA relatively lowly. SRR, however, while it has completed a First Approximation Report, has had limited success at leveraging that accomplishment and moving toward a more detailed product. As one respondent wrote and interviewees reiterated, "Awareness of policymakers is limited." The indicators have not been officially adopted by any organization, and so progress towards "establishing a robust set of indicators" is limited. EPA, on the other hand, has been effective at completing a comprehensive report on the state of nation's environment that was peer-reviewed and widely distributed. It suffered from some controversy, but that should not over-shadow its successes. The same can be said for RSF and Heinz; they both have also produced impressively researched documents, and while outputs are by no means the only measure of effectiveness, they are an important one.

While taking the survey rankings as a baseline, the SRR ranking should be refined slightly downward (see Table 2 below for recommended case groupings for effectiveness as well as the other criteria). SMR should be ranked as somewhat effective as it has managed to create a priority list of indicators but as yet has not produced a report introducing them.

Assessing Relevance: Relevance is a difficult attribute to assess, and much of it depends on the "eye of the beholder." One way to think about the criterion is to consider how "useful" the outputs of the process or the process itself are to both participants and non-participants. As measures of environmental condition, the indicator products of all the cases do promise to be relevant to a large number of stakeholders.

Impressions from the survey and other sources generally agree on rankings for this criterion, although the RSF and SWRR are borderline cases. Some subtle differences do exist that justify ranking SWRR slightly higher than RSF. Relevance of RSF has been limited for stakeholders such as environmental organizations; as Mike Leahy of Defenders of Wildlife and formerly National Audubon Society reported, "it was hard for them to see tangible, on-the-ground results" and "bang for their buck" from participation in the RSF, and have not been very engaged.

While its track record is shorter, SWRR has been able to attract a wider variety of people to attend at least one meeting. Some have high expectations for the output; one environmental organization respondent wrote that they are "confident that it will achieve its goal of establishing a robust set of national water resources indicators."

RSF, on the other hand, has been associated with producing an indicator report, but its current relevance to stakeholders is unclear. Because of its four sector approach, outreach efforts, and high-quality report, Heinz's relevance is relatively strong, although still could improve significantly. The EPA's report has the potential to be highly relevant, but the combination of controversy and ineffective outreach has limited its current salience to stakeholders. SMR has had difficulty maintaining interest from its original participants, and has not yet produced an output that might re-ignite its relevance.

Assessing Legitimacy: Legitimacy as defined above and in the survey includes two primary components—political and procedural fairness—that appear to be similar but do have important differences. Procedural fairness relates more explicitly to the issues of bias and balance in the structure

and conduct of the process, while political fairness refers to the broader organizational context of the process and its relationship to democratic, representative institutions. A third aspect of legitimacy is the transparency and accountability of the process, which is connected to both the procedural and political fairness attributes.

Most of the cases are strong in one or two of these attributes, but weak in a second or third. The EPA process was politically legitimate as an official governmental project, but lacked some procedural fairness, both internally and externally, as all stakeholder views were not heard or given equal weight. It also lacked transparency in decision-making; one respondent wrote that "documentation of senior level decisions" is needed and another that "management level meeting notes [should be made] available to the public." The Roundtables had more procedural fairness as they focused on inclusivity and openness, but lacked official status (none had official FACA status, and only one of the four was formally connected to a Federal Advisory Committee).

Transparency of decisions varied slightly, as the SMR has not posted its meeting minutes or participant lists on its website (and did not provide them when requested). The Heinz case was strong in both procedural and political fairness because it was an officially sanctioned and funded project of the executive branch and engaged a wide variety of stakeholder groups in its deliberations. While its report is quite detailed and the leadership is clearly defined, transparency of the decision-making process could still be improved (meeting minutes and participant attendance records are not available). Nevertheless, it has more transparency and legitimacy than the other cases. The survey rankings can be understood in this context and generally mirror the findings from other sources; the only refinement is to increase Heinz's ranking marginally because it performed better across these three sub-criteria. While it had some engagement of diverse stakeholders early on, the SMR has struggled with keeping them involved. It also lacks official status and high levels of transparency.

Assessing Credibility: The survey groups Heinz and SRR as having more credibility than EPA, RSF, and SWRR. EPA and RSF, however, have gone through a rigorous peer review process and produced well-documented reports, while SWRR still is a work-in-progress. Perception of the EPA process may be overly dominated by the climate change issue; as one respondent wrote, "the Global Climate indicator somewhat impeached the process, but the sense of most people was that that was the exception, rather than the rule." Interviewees emphasized that the indicators were rigorously peer reviewed throughout the process.

The credibility of the RSF, as Dean of Oregon State University's College of Forestry Hal Salwasser noted in an interview, has been constrained by the limited involvement of the academic community and the limits of working within the Montreal Process.[ix] The USFS final report's content and data was nevertheless commented on extensively by Roundtable participants and peer reviewed.

Both EPA and RSF have detailed and lengthy technical documents associated with their public reports. SWRR and SMR, however, have not yet gone through this process, and thus their credibility is correspondingly lower. SWRR written comments were particularly strong about the need to incorporate better science into the process. While pointing out that improvements can still be made, written responses and interviewees had high praise for the credibility of both the Heinz and SRR processes.

Criteria Summary: In light of this discussion, SRR, Heinz, EPA and RSF credibility rankings were increased marginally from the survey's baseline, and are shown in Table 2 below. This table summarizes the conclusions regarding the relative performance of each case across the four criteria, integrating the best knowledge available from both the survey results and other sources of information. These overall groupings of the six cases by rank across the four criteria should be viewed in the context of the general and specific caveats described above. Such an assessment is inherently complex and mired in uncertainty, but it is nevertheless an important analytical tool. The section below will explore the various design choices that may explain the differences among these groupings, and provide the foundation for recommendations to improve performance for each criterion.

[ix] Salwasser added that this problem has been remedied with the addition of a university co-chair to the RSF in 2005.

Table 2: Case Studies by Criteria

Ranking	Effectiveness	Relevance	Legitimacy	Credibility
5: ***Highly***	Heinz		Heinz	SRR, Heinz
4: ***Generally***	RSF, SRR	SRR, SWRR, Heinz	RSF, SWRR, SRR	EPA, RSF
3: ***Somewhat***	SMR, SWRR, EPA	SMR, RSF, EPA	SMR, EPA	SMR, SWRR
2: ***Generally Not***				
1: ***Highly Not***				

KEY DESIGN FINDINGS

> *"Suppose that you want to improve the quality of civic engagement and public deliberation and that you are in a position—through your access to a modicum of financing or state power—to carry out a project toward this end…As with any project of political construction, you face many critical questions in the course of planning your 'minipublic."*[61]

These questions center on specific design choices that will position and structure the public participation process being constructed. The choices about design "factors" can be organized by a series of basic questions, issues and dimensions, as outlined below:[x]

Table 3: Design Dimensions

Question	Issue	Dimension
1. What For?	Vision, Purpose, Goals	Functional
2. How Much?	Funding	Financial
3. Who?	Participation	Membership
4. Where?	Location	Geographic
5. When?	Frequency, Phasing	Temporal
6. How?	Process, Deliberation	Deliberative
7. What?	Subject, Scope, Scale	Content
8. Why? Who Cares?	Stakes	Status
9. Who Decides?	Power, Influence	Governance/Empowerment

A full analysis of these dimensions and their associated design factors in the contexts of the six case studies is included in Appendix F. The analysis categorizes the choices made by each initiative for each design variable, and highlights the similarities and differences among the initiatives in each of the nine dimensions above. Different hypotheses about the effects of certain design choices on effectiveness, relevance, legitimacy, and credibility are also articulated and discussed in light of the results from the last section. The key design choice findings from this analysis are presented below:

Functional Dimension

Including a forum function as a design choice that educates participants about each other's perspectives, encourages open and serious deliberation between participants, and builds trust and respect between diverse stakeholder groups can be an important determinant of an initiative's perceived effectiveness, relevance and legitimacy. Simultaneously incorporating a problem-solving function that actively encourages participants to identify specific policy solutions to collective social problems can increase a program's relevance to stakeholder groups. Having a governance function that delegates some decision-

[x] Adapted from Fung's eight institutional design choices. Several of the dimensions were renamed and the financial and geographic dimensions were added.

making authority to a participatory mechanism can also increase its effectiveness, relevance, legitimacy, and credibility.

Financial Dimension

Well-funded stakeholder processes with long-term financial support are more likely to perform strongly across all four criteria, but must be coupled with other important design choices. Greater diversity and parity of funding sources and in-kind contributions, such as donation of facility space, can also increase a program's relevance and legitimacy. The resuls also showed that more staff support and overhead can enhance the effectiveness of participatory initiatives. The impact of funding for participant travel is unclear because of lack of data, but may have a significant impact on a program's legitimacy.

Membership Dimension

Among the case studies, strong representation from a diversity of stakeholder groups increases the legitimacy of a stakeholder process, while strong participation by the academic community can improve the perception of a program's credibility. On the other hand, having strong participation by government agencies does not guarantee a higher perception of relevance by other stakeholder groups.

Geographic Dimension

Rotating meetings among different geographic areas can increase the relevance and legitimacy of a process, but is not a necessary condition. The data also demonstrated that remote participation between meetings can increase the effectiveness of a stakeholder initiative, and use of an online Delphi status can increase its legitimacy and effectiveness.

Temporal Dimension

Iterative engagement of stakeholders increases the effectiveness of participatory mechanisms, while longer processes are not necessarily less effective than shorter ones. Phasing of program activities is an important element in all of the cases considered.

Deliberative Dimension

Independent facilitators were used in all of the cases considered, and are important to maintaining a program's legitimacy. The appropriateness of different facilitator styles may depend on different contexts. None of the styles used—formal vs. informal, active vs. passive engagement in indicator content—were correlated with higher performance in any of the criteria. Active facilitator engagement in the content has the potential to negatively affect credibility and legitimacy, but may be necessary to keep a process on track and maintain long-term effectiveness. It is important to be aware of this potential tradeoff, and use active engagement as a last resort in complex processes needing additional guidance. High-quality orientations for newcomers were also found to be important when many new people are joining a process in order to reduce misunderstandings and maintain the program's effectiveness.

Content Dimension

The effect of a broader scope is unclear, but it may enhance long-term effectiveness by capturing important elements that might be left out of more narrow and less integrated projects. Having a local focus may increase the relevance and legitimacy of an initiative, but decrease its effectiveness and credibility at a national scale. Having a management or human stress focus may increase a program's relevance, but decrease its legitimacy and credibility. Including interpretation of indicator data may have a similar effect; it can increase relevance while decreasing legitimacy and credibility.

Status Dimension

Having high status leaders and participants can increase a project's legitimacy, relevance, and effectiveness. A direct connection to policy-making processes may increase relevance but decrease legitimacy and credibility. Such a dynamic is unclear because none of the cases have such a connection.

Governance Dimension

Creating leadership teams representing diverse stakeholder groups increases legitimacy and effectiveness. A tradeoff appears to exist between a consensus-based approach and transparency of leadership structure and decision-making. Efforts to increase transparency while maintaining the benefits of consensus may lead to higher credibility and legitimacy. Additionally, it was found that relative insulation from short-term external political forces enhances the legitimacy and credibility of a process, but may also reduce its relevance.

Discussion

FRAMING CONCEPTS

These findings can be viewed independently, but it is more appropriate to view them in conjunction with each other, as many of the design variables are inter-dependent and synergistic. They can also be interpreted as recommendations in and of themselves, but may be more effectively utilized in broader conceptual and organizational frameworks. In order to answer the key policy question regarding the most effective way to involve stakeholders in the development of national environmental indicators, it is useful to frame the problem in the context of managing "boundaries." As Cash et al. state,

> "Such boundaries demarcate the socially constructed and negotiated borders between science and policy, between disciplines, across nations, and across multiple levels. They serve important functions (e.g., protecting science from the biasing influence of politics, or helping organize and allocate authority), but they can also act as barriers to communication, collaboration, and integrated assessment and action. Managing such boundaries seems to be a fundamental element in effectively linking knowledge to action."[62]

Environmental indicators are created and used by a range of actors in different social worlds,[xi] and efforts to create a national set of such indicators will inevitably cause contestation over them. They can become "boundary objects" that sit between multiple social worlds and facilitate communication across boundaries. In order to create these objects, however, their contestation must be guided by encouraging strategic crossing of those boundaries. The six case studies can be thought of as "boundary organizations" that can actively manage such interactions among different worlds.[63]

Recognizing that conflict over values, goals, and strategies (ends and means) is an inevitable and essential element of such dialogue is critical. As Stephen Carter writes, "Civil dialogue over differences is democracy's true engine: we must disagree in order to debate, and we must debate in order to decide, and we must decide in order to move. And it all works, as James Madison noted in Federalist No. 10, only if we begin by understanding the necessity of disagreeing: 'As long as the reason of man continues fallible, and he is at liberty to exercise it, different opinions will be formed.'"[64] The role of boundary organizations is to create "arenas of bounded conflict" that establish ground-rules and pose general questions for such debate.[65]

[xi] Gieryn defines a social world as a "group with shared commitments to the pursuit of a common task, who develop ideologies to define their work and who accumulate diverse resources needed to get the job done." *In Jasanoff, S., et al. 1995. "Boundaries of Science," Handbook of Science and Technology Studies. Thousand Oaks, CA: Sage Publications, p. 412.*

It is also important to recognize that many of the disagreements will be difficult to resolve in the first iteration of dialogue, and may require more time and experience to reach a final conclusion. In this context, the concept of adaptive management is applicable; agree to disagree, and then make a decision with the understanding that new information may demand a change in course.[xii] The ultimate measure of success for environmental indicators is whether they are measuring what society wants to know about the environment. As indicators are adopted, mechanisms to assess their usefulness and acceptability to society should be created and utilized in refining and improving the indicator set. Such adaptive management can be an important task of boundary organizations such as the Roundtables, EPA's stakeholder process and the Heinz Center.

STAKEHOLDER ENGAGEMENT: KEY DRIVERS OF PERCEIVED EFFECTIVENESS

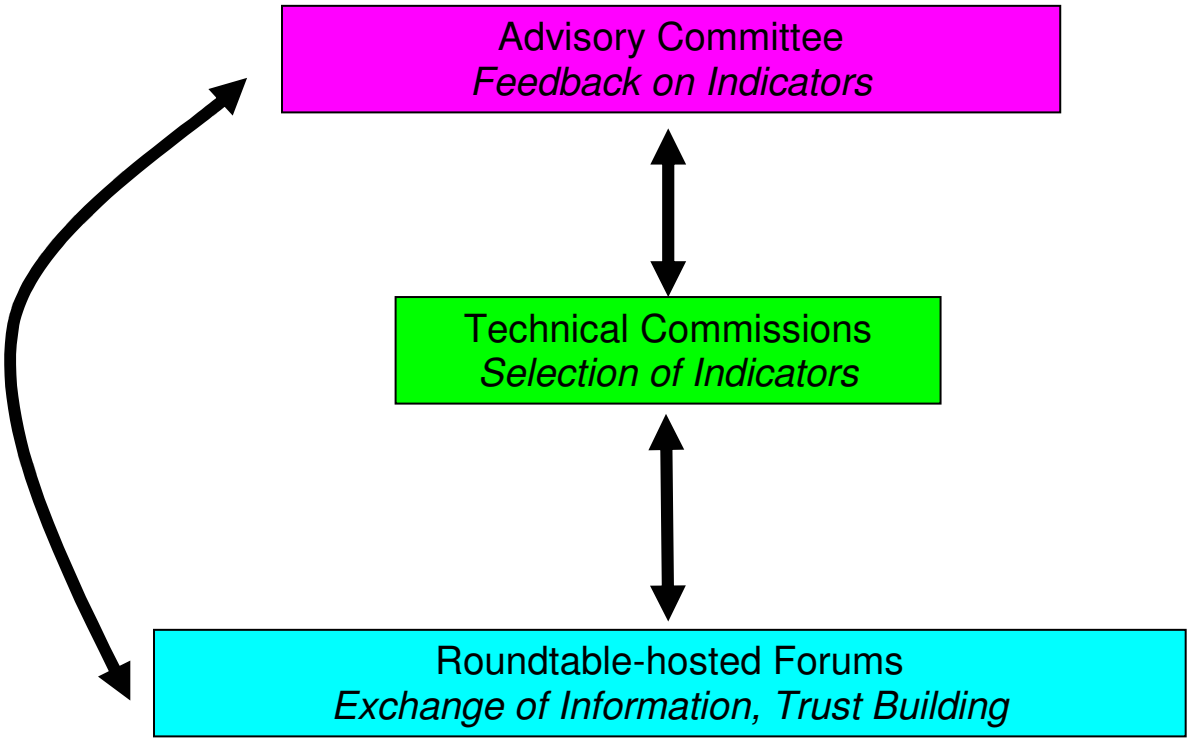
With these framing concepts in mind, potentially key factors driving the perceived effectivness of boundary organizations' stakeholder engagement can be further analyzed. This section describes several design characteristics that this project's research suggest may be important and even critical to effectively engaging stakeholders.

A Tiered Approach to Stakeholder Engagement: The four functions of communication and trust-building, advisory comment, problem-solving, and decision-making are all important aspects of involving stakeholders. Each can have different and often conflicting effects on the effectiveness, relevance, legitimacy, and credibility of participatory processes. The results of this paper suggest that stakeholder involvement initiatives should seek to incorporate each of these functions through distinct but inter-connected mechanisms.

These four different functions should be integrated in these processes because they have strong potential to complement and strengthen each other. All of the Roundtables, for example, have suffered from a lack of sustained participation from important stakeholder groups, and the lack of official and independent advisory status is probably a cause. Some interest groups, in particular environmental organizations, do not see the Roundtables as important or relevant to their short-term policy priorities to justify their involvement. There is no overarching pull for them to participate. At the same time, the exclusivity and narrow focus of many Advisory Committees reduce their relevance in the eyes of the general public and their legitimacy to stakeholder groups not at the table. Both, however, have their strengths, as the Roundtables can enhance relevance and legitimacy and Advisory Committees often have high credibility and a direct link to policy-making. By connecting them together but keeping them distinct, a tiered approach can benefit from the contributions of both mechanisms.

[xii] The ideas of both bounded conflict and adaptive management are explored in-depth by Kai Lee in *Compass and Gyroscope: Integrating Science and Politics for the Environment.*

Figure 4: A Tiered, Multi-Functional Organizational Structure for Stakeholder Engagement



Confusion between communication and collaboration can also be reduced by a differentiated approach. The Roundtables are both a forum for communication among stakeholders and collaboration around the completion of specific problem-solving tasks, which can create conflicts in priorities and goals. Efficiency and output production are the focus of a task-orientation, while involvement, trust and understanding are the focus of a forum-orientation. If these functions are separated operationally but connected institutionally, they may achieve their goals more effectively while maintaining the benefits of linkage. Such an arrangement also can create structural incentives to engage for stakeholders who have viewed indicator development as irrelevant to their short-term policy orientation but are nevertheless important for their "show-stopping" abilities (see obstacles section above).

These mechanisms can be organized in a tiered organizational structure as illustrated in Figure 4. Such a structure might include the following three components:

- **Roundtables** that host recurring forums to discuss issues related to the indicators and interpretations of their meaning. These face-to-face forums could be rotated around the country and co-sponsored and hosted by government, industry, academia, and non-profits. They could include a wide array of stakeholders with conflicting views, and be open, inclusive, and well-publicized. They might also provide opportunities to interact remotely as well, through both digital and published form, similar to the Forest Roundtable's Multiple Perspectives Project. Individual participation may be limited to one appearance, but people would be encouraged to continue coming to build up a shared sense of community and trust. The controversy and intensity of the deliberation may be high at times, and should not be short-circuited prematurely.

- **Advisory Committees (ACs)** that advise a particular agency or set of agencies on specific natural resource issues. These committees would be similar to those required by the Federal Advisory Committee Act, with formal procedures for nomination, selection, and operation. A

"balanced" representation of industry, non-profit, academia, and state and local government representatives would be required, and sectors would be encouraged to coordinate and nominate people who would best represent them. Committees members would be tasked with communicating the perspectives expressed in the Roundtables as they deliberate with each other. They would work towards a unified expression of their preferences to the government, but disagreement with the prevailing opinion would be allowed to be expressed as a Dissenting Opinion, following the Committee's formal reports, which should be made available to policy-makers.

- **Technical Commissions (TCs)** that focus on the problem of selecting and refining indicators and coordinating efforts to find or collect data to populate them, similar to the Heinz Center's Working Groups or the RSF's Technical Working Group. This group would focus on ensuring the credibility of the indicators and their data, and would also include a diverse set of stakeholders selected both for their technical competence and sectoral affiliation. A white paper process should be put in place where individuals conduct research on a particular indicator and then present it in written form to the group for review. Ideas from the field of joint-fact finding are particularly appropriate.[66] Iterative participation for both Commissions and the Advisory Committees would be essential to this process.

Both the ACs and TCs could be imbued with some decision-making power, even if it is only to produce independent reports and statements to the public. Additionally, a fourth component could be included that has more governance authority, such as an external Board (this idea will be returned to below in the context of a national system of environmental indicators).

Optimal design decisions may be different for each of these different organizational components, and should be considered individually. Many of the tradeoffs between design choices, such as the challenges associated with the question of geographic scale, can be usefully hedged through this tiered system. For example, engaging local issues can increase legitimacy and relevance while decreasing credibility and effectiveness. By including local perspectives in the forum component but isolating it from the others, the tiered structure captures the benefits while minimizing the costs of such engagement. The same may be true for discussions of management, stresses or the meaning of the data; these debates can be held in the forum and advisory modes while keeping the technical commission mode focused on condition and data presentation. If necessary, additional commissions could be established to systematically confront management, stress, or interpretation issues.

High Status and Diverse Leadership: Another factor that might be driving the success of engaging stakeholders may be the visibility and support of high status leaders and participants. Efforts should therefore be made to recruit respected and influential individuals from multiple sectors to take leadership roles. These leaders do not have to be engaged throughout the process, but should be present at key junctures (e.g. the beginning and ending of phases) and aware of the program's status. Such engagement will encourage others to remain involved and active in the process. Remote communication between these leaders and other participants can help serve this purpose.

Transparency of Decision-Making Structures and Processes: Decision-making transparency may also be an important factor as well. A four sector co-chair arrangement may contribute to increasing such transparency and maintaining the balance and legitimacy of these processes. A rotating executive chair position that is responsible for making final decisions might also increase accountability and transparency, even though a consensus-based approach might still be preferred to foster trust in the group in some contexts. Regardless of the arrangement established, it should be well-documented and publicized to both participants and the public. Records of the decisions made and their justification should also be maintained and accessible on-line.

Integrated, Broad-Based Approach: Integrated, broad-based approaches to resource monitoring and management also appear to increase effectiveness. As Terry Shultz of The Nature Conservancy's Colorado Office concluded, "Because we're not looking at the land as a whole, we may be missing some

of the cumulative threats that happen across resources, things that fall through the cracks."[xiii] The possibility of creating synergies and avoiding unnecessary duplication among different approaches may also be missed. The institutional structure should, however, enable specialization related to specific resources. The Heinz Center and EPA initiatives provide a beginning model for such a balance.

Independent Lead Organization: Having independent individuals and organizations that effectively and neutrally bridge multiple boundaries may also be a critical factor. The independent facilitators of all of the processes added great value, and the ability of the Heinz Center to maintain itself as an independent organization has undoubtedly contributed to the success of the State of the Nation's Ecosystems Report.

Long-Term Planning of Process Phases: If stakeholders understand up-front the scope and duration of the initiative, they may be more likely to buy into it. Sequencing of stakeholder involvement should therefore be planned in advance and publicized broadly. Different interest groups and individuals should be recruited to engage the process at appropriate phases, depending on their relevance, status and expertise. While not all relevant stakeholder sectors necessarily need to be engaged in every component continuously, they should be aware of and have ownership of the activities and plans of each component. The same is true for engaging geographic diversity; efforts should be planned to regularly engage stakeholders around the country, even if they are not involved in every step of the process. Establishing such plans as a foundation for the program is worth the effort; as one interviewee said, "go slow early in order to go fast later." Although it can be improved, the Heinz Center's five-year plan is an example of such an approach.

DESIGN CHOICES AND THE SIX CASE STUDIES

This discussion of potentially important design characteristics can inform the future development of stakeholder engagement processes in general, as well as the six case presented in this paper. Below the strenghs and weaknesses of each initiative, and discuss possible reforms that might improve the effectiveness of their efforts to engage relevant stakeholders.

Roundtable on Sustainable Forests (RSF)

The RSF has many strengths upon which to build upon, including the strong support and engagement of the Forest Service, the trust and rapport that has developed among participants, and its commitment to inclusiveness. The RSF has pioneered several innovative approaches, including the Multiple Perspectives Project and Regional Workshops, that are useful models for engaging stakeholders. The engagement of high-level Federal and Non-Federal Co-Chairs and the utilization of a professional facilitator firm have also been strengths of the process. Its motto of "Better Data Leads to Better Dialogue, which Leads to Better Results" is particularly appropriate.

Diversity at the Roundtable has been good but could be improved; as Brian Kernohan of Boise Cascade reported, "We would like to see more significant participation from the environmental and NGO community, particularly given the fact that it's an open and inclusive process." Paying attention to the key drivers of successful engagement discussed above may improve such representation as well as the overall effectiveness of the Roundtable.

The Roundtable and relevant agencies might also consider establishing an interagency **"Sustainable Forests Advisory Committee" (SFAC)** that focuses equally on condition, stresses, and management solutions. This committee could take the inter-agency Advisory Committee on Water Information (ACWI) as a model but not be as limited in scope. It should have seats for non-profits, industry, states, tribes, academia and other groups and create reports that express both areas of agreement and areas of disagreement (with statements from differing points of view). These reports should be independent and not subject to review by any agency. The Forest Service currently lacks a public advisory entity that provides advice on national-level priorities and issues, and this SFAC would fill that vacuum and enhance the legitimacy of the agency as a whole.

[xiii] Shultz is a member of the Sustainable Rangelands Roundtable.

The Roundtable could also host an annual **National Forum on Sustainable Forest Policy** that has a similar focus to that of the SFAC. Models from deliberative democracy, such as James Fishkin's deliberative polling approach, should be explored as alternatives to a traditional breakout/plenary session model.[xiv] Communication between people focusing on condition, stresses and management should be encouraged at the Forum. Efforts at the local and regional levels, such as the Local Unit Criteria and Indicator Development (LUCID) Program, should be presented and linked to national level activities. The Roundtable should be maintained as an inclusive arena for dialogue about both indicators and forest policy issues, and continue to host projects such as the Regional Workshops and Multiple Perspectives Project. The Roundtable's leadership should be expanded to include representatives from the non-profit community, which will require more active outreach on the part of the Forest Service and other Roundtable members.

The status of the Technical Working Group might be elevated to a **"Technical Commission on Sustainable Forest Indicators" (TCFI)**, and its members should be both technically competent and representative of diverse sectors. This TCFI would continue to provide feedback and assistance to the US Forest Service on completing the next version of the Report on Sustainable Forests. Along with the TCFI, The Sustainable Forestry Partnership should be utilized to better engage the academic community. Providing opportunities for peer-reviewed articles to be published as the SRR has done is one innovative mechanism to encourage their involvement.

Sustainable Minerals Roundtable

The SMR is confronted with perhaps the most contentious and controversial resource area, and has responded to the challenge with laudable persistence. Its strengths are a small core group of people who have maintained their involvement, a systematic process of prioritizing its indicators, and an innovative theoretical framework for sustainability. It has suffered from abandonment of the process by many stakeholders, lack of funding and limits on federal staff time tasked with coordinating the project.

In order to overcome these obstacles, the SMR might consider implementing an arrangement similar to the one outlined above for the RSF, with the goal of producing a full report on sustainable minerals in the near future. It could also improve the transparency of the process by posting the meeting minutes and participant lists on the website. Additionally, higher-level leadership from multiple sectors, including government agencies, could also be recruited to better leverage the work being done by current staff. These leaders could be appointed Co-Chairs of the Roundtable, with responsibility for increasing participation from other stakeholders.

Sustainable Rangeland Roundtable

The SRR has made remarkable progress thus far, but still has many challenges facing it. Its strengths are strong participation from range scientists, multiple links to the Society of Range Management, a valuable sense of community and trust, and a credible set of indicators. Its use of the Delphi process and practice of rotating meetings have contributed significantly to its success. Its challenges include charting a path now that the First Approximation Report is complete, and engaging policy-makers at the national level to commit to a Sustainable Rangeland Report by 2010. It also needs to engage environmental groups, producers, sheepherders, and recreation groups more effectively.

In order to achieve these goals, the Roundtable could also implement an arrangement similar to the one outlined above for the RSF, making use of a tiered, multi-functional approach to stakeholder engagement. Such an approach might broaden the appeal of the process, increase participants' ownership of the process and its outputs, elevate its political visibility and leverage, and increase its effectiveness. In particular, establishing an inter-agency "Sustainable Rangelands Advisory Committee" will help coordinate work between the agencies and bring more attention to this important resource. The

[xiv] More information about James Fishkin, a Professor of Communications and Political Science at Stanford University, and his approach can be found at the website for the Center for Deliberative Democracy, http://cdd.stanford.edu/.

composition and role of the Steering Committee and co-conveners could also be clarified, as the current amorphous nature of the committee, which has seats for agencies rather than individuals, makes coordination and consistent leadership difficult. Additionally, the Roundtable could better leverage its relationship with the Society for Rangeland Management , which is itself an important boundary organization between federal agencies, researchers, and the rancher community.

Sustainable Water Resources Roundtable

The SWRR is the newest of the Roundtables, but has already made significant headway towards developing national environmental indicators. Its connection to the Advisory Committee on Water Information (ACWI), industry support through the Electric Power Research Institute, and broad-based participation and funding support are its strengths thus far. It may at times appear disorganized, but it is operating on a tighter budget and faster timeline than the other processes. It is missing deep engagement from many stakeholder groups, including non-profits, businesses, and academics, as most participants have only attended one meeting. Injecting more science into the process is a particularly important challenge.

In order to meet these challenges as opportunities, the Roundtable might consider Immediately establishing an **Indicator Development Working Group,** whose members are explicitly named and are both technically competent and representative of the major stakeholder groups. This group would have the responsibility of further refining the indicators and drafting the First Approximation Report. They would be accountable to both less frequent participants and the ACWI and be required to document and justify its decisions. The current arrangement is too opaque and not sufficiently transparent. As one written response stated, "it may be too legitimate—too many views, difficult to focus." Representatives from missing water interests, such as environmental groups, the business community and western water management agencies, might also be more actively recruited. In order to attract their participation, a commitment to incorporating their priority interests (e.g. ecological integrity or water quantity) may be necessary. Similarly, high status, well-respected water resource scientists could be recruited to improve the scientific credibility of the indicators and build on the best ideas and practices in the field. The Roundtable might also benefit from more active participation from other federal agencies that deal with water issues, such as EPA.. Synergies between the EPA's Draft Report on the Environment process and this effort should be explored, especially the potential for future collaboration and coordination. Finally, the Roundtable could plan to host a **National Forum on Sustainable Water Resources** to roll-out and present the First Approximation Report.

EPA Draft Report on the Environment

Even though it has been overshadowed by the controversy over the climate change issue, the Draft Report represents a major step forward for the Environmental Protection Agency and the nation by providing an integrated perspective on the environment. Its strengths include a thorough peer review process and the efficiency (18 months) by which it was produced. Bringing together the agency's stovepipes was a major accomplishment, and the National Dialogue was an innovative process for engaging stakeholders. However, many might claim that it was too little, too late, and its effectiveness and legitimacy suffered as a result. The agency is currently crafting a new stakeholder strategy for the 2006 Report, and is committed to taking a broader and more systematic approach to engaging the public.

In support of this goal, future iterations of the report might benefit from the involvement of a broader range of stakeholders substantively throughout the process, rather than primarily at its end. The innovative National Dialogue process could be adapted into a continuing forum function that gains feedback on the Report all the way through its development. A Technical Commission of diverse external stakeholders who are technically competent could be created to assist with refining and populating the indicators, rather than depending exclusively on outside consultants. Such a process may be less efficient, but may also result in great added-value down the line as the legitimacy and credibility of the report is boosted by the Commission's involvement and endorsement.

EPA might also explore ways to better leverage the existence and engagement of the National Advisory Council for Environmental Policy and Technology (NACEPT), which is an imperfect but valuable example of the type of diverse and broadly-focused advisory mechanism introduced above. NACEPT provided useful and in-depth comments on the Draft Report, but was not visible in defending it as the climate change controversy overwhelmed its publication. This demonstrates the isolation and limited influence of the current advisory committee framework when it lacks a connection to a broader forum that is accessible to the public. Members of NACEPT should be encouraged to attend and speak at National Dialogue meetings, and incorporate the views expressed into the Council's important work.

EPA could also work more closely with CEQ on its efforts at creating a national environmental indicator system, which very much are in line with the interests of EPA. Ultimately, the agency should consider spinning off the Report on the Environment from the agency to a new institution dedicated to environmental statistics, as such reporting may not ultimately be within the mandate or core competencies of the agency. As mentioned above, half the data for the report came from non-EPA sources, and most of the writing and research was conducted by outside consultants. A national environmental indicator system that is independent of the agency could provide the data needed to enable the agency to continue to manage for results, while allowing it to focus on its core responsibility of environmental protection and regulation. It might also stop political controversies around such reporting from marring the reputation of the agency as a professional, science-driven institution.

The Heinz Center State of the Nation's Ecosystem Report

According to many of the interviewees across the case studies, The Heinz Center's process is the leading model of stakeholder engagement in the development of national environmental indicators. Its broad-based approach, four-sector engagement strategy, tiered organizational structure, clear goals, and strong and diverse financial support have all contributed to its success, which was reflected in both the survey and participant interviews. It did not perform as well in the relevance criterion as it did in others, which may have in part been by design. As the process continues, however, the need and value of making the indicators more relevant will only increase. The importance of maintaining and increasing their credibility and legitimacy will intensify as well.

The Center therefore could benefit from strengthening the Center's forum function by hosting a series of "State of the Nation's Ecosystems" Regional Forums around the country. Such forums would increase the visibility of the process and solicit feedback from a wider array of stakeholders. High status policy-makers and business, non-profit, and academic leaders could be invited to participate and engaged on the need to institutionalize these indicators more permanently. These forums could also help with the development of a set of core indicators, which would be representative of the other 103 in the report and would make the report more accessible and relevant to a wider audience. Such a core set should be clearly linked to the other indicators in the report to maintain its comprehensive and integrated nature. While such core indicators could increase the project's salience, its legitimacy could be increased by improving the transparency of its process by documenting and publishing online the decision-making process and justifications for specific decisions. As one participant stated, the need for such transparency will increase as the relevance of the indicators increases. Meeting notes and participant attendance should be made available as well.

In order to raise the legitimacy of the Report, the Heinz Center might consider re-connecting with the initiative's Senior Advisors by convening them as an Advisory Council to the Heinz Center Board of Trustees. These Advisors could be required to meet once a year to review the status of the report process, and provide a progress report to the Board. Explicit mechanisms for Working Group and Design Committee members to contact Advisors about issues of fairness that arise could also be created. This Council might therefore create an added level of legitimacy to the project and blunt potential accusations about the bias of the Center. It might also enhance the relevance of the project as these high status advisors become more engaged in its operations and aware of its needs. Additionally, the Center could continue to work closely with the CEQ and KNII efforts to create a national institution for coordinating environmental information, and ultimately promote the spinning off of the State of the Nation's Ecosystem's Report to such an institution. Such an evolution could free up the Center's resources to

leverage its reputation as an honest broker to tackle other important issues related to science, economics and the environment.

STAKEHOLDER ENGAGEMENT AND A NATIONAL INSTITUTION FOR ENVIRONMENTAL INDICATORS

A recent GAO report on "Informing the Nation" suggested several possible institutional options for developing and implementing a key national indicators system. These options include a new public institution (similar to the Census Bureau), private organization (similar to the National Academy of Science), or a public-private organization (similar to the Smithsonian Institution). The report also discussed the advantages and disadvantages of a new versus existing organization, and concluded that "a new public-private organization could offer the greatest flexibility to apply key design features" of such a national system.[67] Congressman Doug Ose (R-California) has also introduced a bill that would create a Bureau of Environmental Statistics under the auspices of a cabinet-level Department of Environmental Protection. Paul Portney of Resources for the Future has also been advocating for such a bureau for many years, and Spencer Banzhaf issued a new call for it in a recent Resources for the Future publication, *New Approaches on Energy and the Environment: Policy Advice for the President*, (2004) *edited by* Richard D. Morgenstern and Paul R. Portney (p. 129), but neither express a preference regarding the institutional home for this important new function.

Regardless of which particular option is most appropriate or ultimately selected, a well-designed strategy for engaging external stakeholders is necessary. Traditional approaches of public comment and advisory committees, while important, may not be sufficient to effectively bring together the diverse social worlds that will contend over this new system. An innovative, multi-faceted approach that takes into account the complexity of these worlds and the design choices necessary to mobilize them may instead be necessary. The six case studies in this paper all offer important lessons learned and best practices to inform such a new approach, and are discussed in the sections above. The tiered, multi-functional organizational structure may be particularly appropriate, as is the importance of having high status, diverse, and independent leadership and a transparent decision-making process.

From this perspective, the public-private Smithsonian model recommended by the GAO may indeed be the most likely to be perceived as legitimate, as it may be most capable of adopting such attributes. This "Smithsonian" model, for example, could adopt a tiered organizational structure that had the following stakeholder engagement mechanisms (see Figure 5 for an illustration):

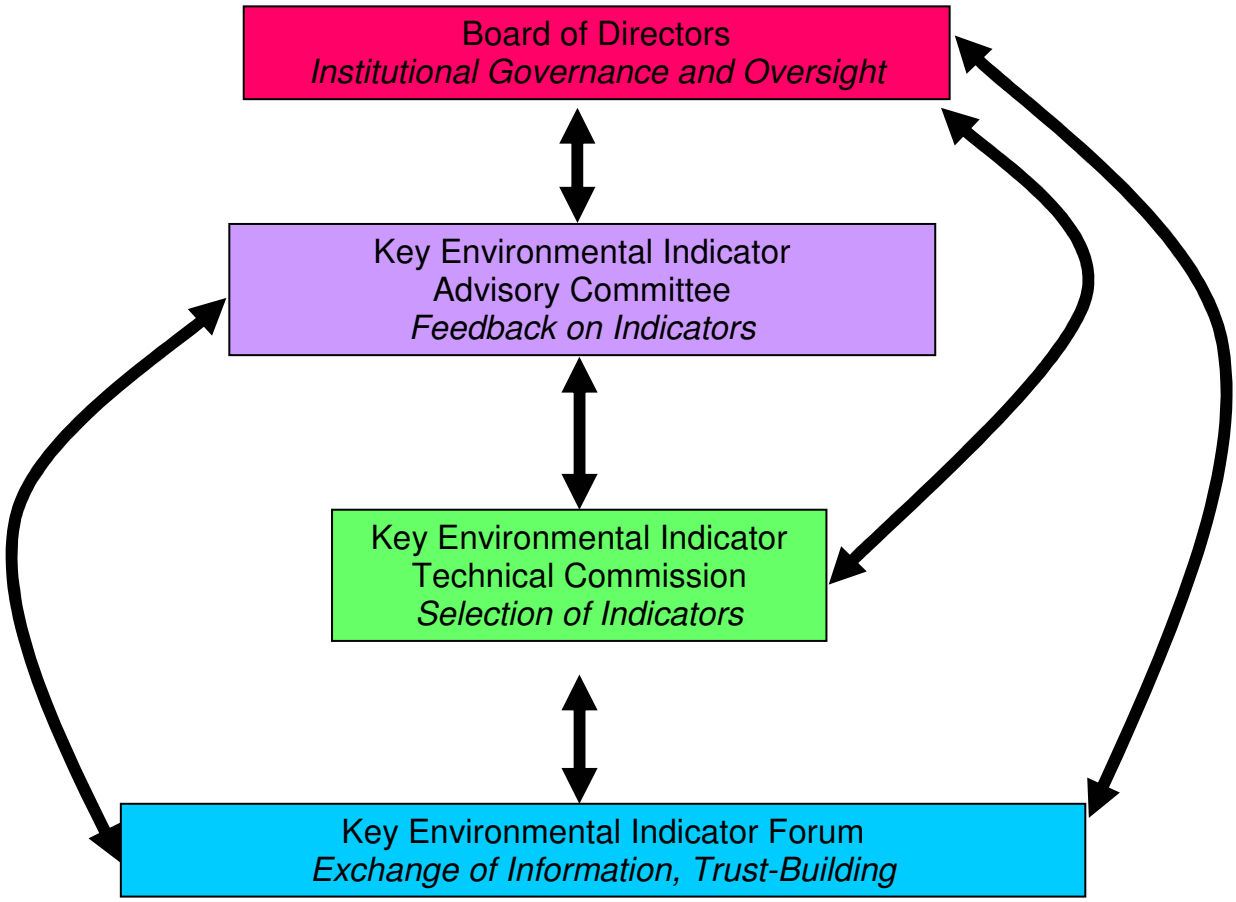
***Board of Directors*:** Modeled after the Smithsonian's Board of Regents, this Board would be responsible for supervising the work of the Bureau and ultimately accountable for its decisions. It would have a representative balance of major stakeholder interests and political orientations, with a transparent nomination and governance process. Members would be high-profile, well-respected, and informed leaders from diverse sectors of society who have an interest in promoting a robust system of environmental indicators.

Environmental Indicators Advisory Committee: This Advisory Committee would include an even broader set of stakeholder interests, especially those not directly represented on the Board of Directors. Members of the Committee would be high status organizational representatives and provide advice to the Bureau on its outputs and indicators, similar to the role of EPA's National Advisory Council for Environmental Policy and Technology (NACEPT). It would resemble the Advisory Committees recommended above.

Technical Commission on Environmental Indicators: Such a bureau would ostensibly have its own staff to implement such a national system, and could possibly incorporate existing monitoring and statistical programs currently housed in disparate agencies. Regardless, the Bureau will need to tap into the knowledge and datasets available outside of the federal system, and will need a mechanism to facilitate such cooperation. Such a Technical Commission could serve this task, as well as help the bureau think about and solve the complex challenges associated with environmental indicators. This representative Commission would also be responsible for providing regular reviews and critiques of the indicators, presenting both areas of accord and discord.

Annual Forum on the State of the Nation's Environment: The Bureau could also host an annual forum that presents its indicators to a wide audience of interested stakeholders. Such a forum would be open, inclusive, and well-publicized, and could be rotated around the country to expose broader groups to the work of the Bureau. It would also be an opportunity to receive feedback and criticisms from a more diverse spectrum of interests. The Board of Directors, Advisory Committee, and Technical Commission members should be required to attend, and act as liaisons between the public and the Bureau. Participants would be encouraged to attend regularly to build a sense of community and trust through the Forum.

Figure 5: National Bureau of Environmental Statistics



These four components should be designed to maximize the Bureau's relevance, legitimacy, and credibility. While taking into account all three criteria, the Forum could focus on building the Bureau's relevance and legitimacy, the Technical Commission its credibility and legitimacy, and the Board its legitimacy and relevance. Such an arrangement would help enable the Bureau to balance the tradeoffs between these criteria and increase its effectiveness over the long-term.

The lessons learned, best practices, and key findings of the case studies should be incorporated into the institutional design process. Paying attention to each of the nine design dimensions and their associated factors and the tradeoffs associated with each is critical to successful stakeholder engagement. The Heinz Center's implementation strategy and governance structure, RSF's Multiple Perspective Project and Regional Workshops, EPA's National Dialogue, SRR's connection to the academic community and

the Society for Range Management, SWRR's diverse funding sources, and SMR's rejected indicator documentation all provide useful models to adapt to the work of the Bureau. At the same time, conflict over both the institutionalization and implementation of this national indicator system should be expected, and arenas to bound that conflict effectively should be established in advance. Using and seriously committing to a concept of adaptive management that links sound science, experimentation, and stakeholder involvement will greatly facilitate this institutionalization process and increase its chances of success.

CEQ and other actors can also learn from the experience of establishing economic indicators, such as the GDP and unemployment rate, although they should be conscious of the differences as well. The current political atmosphere is much more evenly divided and polarized than it was as the GDP was being developed. Civil society is also much more activated and capable of mobilizing to resist threatening new initiatives. The challenges are "similar but different," and will require more active and nuanced outreach to the public than in the past. Such outreach will take resources, and therefore sufficient funds should be committed to both the Bureau's work and its stakeholder engagement programs. Piecemeal financial support will signal a lack of real commitment to the goals of the initiative and the need for seriously engaging diverse groups. Funding could come from a combination of public and private sources, and include both private and non-profits donors (similar to the Heinz Center or the Smithsonian).

Conclusion: Obstacles and Opportunities

In light of the many obstacles outlined in this paper, the creation of such a national institution will be particularly challenging. An important window of opportunity exists in the next few years, however, to catalyze movement on environmental indicators. That opportunity is the 100th anniversary of Theodore Roosevelt's Governors' Conference on the Conservation of Natural Resources, held in the White House on May 13, 1908. That conference was an epoch-making event in the history of conservation, focusing the attention of nearly all the country's governors, congressmen, senators, Supreme Court justices, cabinet members, and prominent businessmen and labor leaders such as Andrew Carnegie and Samuel Gompers, on the issue of conservation.

President Bush can use its anniversary to promote his own vision of responsible environmental stewardship, and just as the 1908 Conference shaped the environmental policy of the 20th century, a 2008 Conference can shape policy for the 21st. A central theme of the 1908 gathering was the need for better information about the nation's natural resources, and resulted in the creation of 38 state conservation commissions.[68] An Anniversary Governor's Conference could have a similar focus, echoing the President's focus on managing for environmental results, and centering on the creation of a National Bureau of Environmental Statistics to coordinate a comprehensive environmental monitoring and reporting system. It would also provide a vehicle to highlight the President's emphasis on seeking market-based and decentralized solutions to environmental problems and empowering states, industry, and private landowners to be effective environmental stewards, as a proper anniversary would mirror Roosevelt's broad-based guest list. It could also promote the administration's cooperative conservation message, and enable Republicans to re-claim their conservation heritage and challenge Democratic hegemony among environmentalists. Most importantly, however, it provides a unique platform to advance the cause of tracking the state of the nation's environment in a relevant, legitimate, and credible fashion, a cause that is non-partisan and important to all Americans.

CEQ could therefore coordinate the roll-out of a National Bureau of Environmental Statistics with an anniversary celebration of the White House Governor's Conference on the Conservation of Natural Resources in May of 2008. Such an event would build on and highlight the work of CEQ's Interagency Working Group on Indicator Coordination, the Roundtables, EPA, and the Heinz Center. It could also provided added momentum to these initiatives as they continue their important work over the coming years.

In conclusion, such a Bureau and national system of environmental indicators has the potential to greatly improve the quality of environmental data, knowledge, and policy-making. This will only be possible if it

effectively engages powerful stakeholders in meaningful and multi-faceted ways, and this paper offers many suggestions toward achieving that end. It is hoped that its findings and recommendations will be useful to leaders in government, industry, civil society, and academia in thinking about and designing public participation in the development of national environmental indicators. It is particularly relevant to the ongoing work of CEQ, the Key National Indicators Initiative, GAO, the National Academies, the Roundtables, EPA, and the Heinz Center. This paper provides lessons learned for each institution as they consider the best mechanisms to engage stakeholders, which ultimately should lead to the successful development of a robust set of national environmental indicators and improved national environmental policy-making.

NOTES

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