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## Impediments to and Opportunities for Fulfillment of the Rational Comprehensive Intent of the National Environmental Policy Act

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IMPEDIMENTS TO AND OPPORTUNITIES FOR FULFILLMENT OF THE  
RATIONAL COMPREHENSIVE INTENT OF THE NATIONAL ENVIRONMENTAL  
POLICY ACT

by

Brian P. McMullen

A THESIS

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IMPEDIMENTS TO AND OPPORTUNITIES FOR FULFILLMENT OF THE  
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University of Nebraska, 2010

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The National Environmental Policy Act of 1960 (NEPA) initiated the study and practice of environmental impact analysis. Upon passage, NEPA transformed the process in which the federal government plans, seeks input on, and documents major projects of environmental significance. While NEPA has surely affected project-level incremental actions, its rational comprehensive mandate as expressed in Title II of the statute has remained largely unfulfilled. Neglect of Title II has occurred as a result of broad language in NEPA that is difficult for federal judges to interpret and administrators to implement. Political interference with the President's Council on Environmental Quality (CEQ) has also undermined efforts to implement the provisions of Title II.

Despite limited success in implementing Title II of NEPA, the need for comprehensive environmental monitoring and reporting persists. A decade-long series of policy reports from specialists both in and out of government has called for a national ecological indicator system. Analysis of these proposals demonstrates a clear need for coordination in ecological information. What these reports do not suggest, however, is a clear institutional home for comprehensive environmental efforts. While CEQ may be the logical home by statute, it competes with EPA for these responsibilities.

If CEQ is to restore its comprehensive mandate, it must develop a comprehensive product that differentiates itself from the efforts of EPA. This product must be science-based, but also accessible to the public and decision-makers without expert knowledge of environmental science. It must relate to fundamental components of a future, comprehensive ecological indicator system, yet also incorporate new methods of environmental accounting such as Ecological Footprinting. The product must be low-cost, easily updateable, and scalable to local, state, regional, and national efforts. Most importantly, it must retain a connection to Title II and the environmental values espoused by NEPA.

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## Chapter 1: Introduction and Purpose

The National Environmental Policy Act of 1969 (NEPA) is an ambitious statement of national environmental intent. NEPA encourages responsible decision making on federal projects of environmental significance by requiring an informed, open, and interdisciplinary process for reaching decisions. NEPA's action forcing mechanism — the Environmental Impact Statement (EIS) as outlined in Section 102(c) of Title I of the act — is the primary operative component of the Act and the means for achieving this open, informed process. More broadly and boldly, NEPA intended not only a policy shift in federal activity and administration, but also the creation of a new national environmental ethic (Bear 2003, 932). This ethic is comprehensive in character, viewing the environment as composed of complex and interrelated systems. This ethic is wary of reductionism and the tendency to frame environmental health in terms of specific pollutants or species. The ethic encompasses issues of economic growth, resulting depletion of resources, and intergenerational equity. To direct and report on the federal government's progress toward these ideals, Title II of NEPA created the President's Council on Environmental Quality (CEQ), a new administrative body in the Executive Office of the President (EOP).

NEPA's lofty policy goals are grounded in a process of rational expert analysis (Bartlett, R.V. 1986a, 1986b, 1999). NEPA intends that once a process of informed, public analysis has been completed, agency managers will be persuaded to consider project alternatives with the least environmental impact. At a minimum, agency managers will feel public pressure to justify decisions that have negative impacts. NEPA

also presumes that CEQ leadership will be willing and able to advocate the institutional priorities of CEQ above the political priorities of the President. Like agency impact assessment, much of CEQ's mandate in Title II is dependent on the degree to which it can be rationally administered by a cadre of politically-detached experts.

Forty years after its passage, NEPA is still wrestling with its lofty intentions and the challenges inherent in comprehensive environmental policy. NEPA principles are inspiring to those who share a reverence for the global ecosystem. To those who do not share the same priorities, NEPA principles may ring hollow and fail to compel the minimization of environmental impacts. While NEPA does not require positive environmental outcomes by law, it surely hopes to foster them. If NEPA is to maintain relevance over the next forty years, it must be acknowledged that NEPA's reliance on a process of rational, politically-detached analysis has at times not produced the results envisioned by NEPA's drafters. As with other policies and plans, practice complicates theory.

With an acceptance of both NEPA's achievements and criticisms in mind, it is appropriate to analyze the impediments to NEPA's rational comprehensive planning orientation that have evolved during forty years of implementation. This analysis is necessary if NEPA is to play a future role in safeguarding our Nation's environment.

Impediments to implementation of NEPA's policy intent exist in three primary areas: legal, administrative, and informational. Political concerns intertwine all three. These impediments have received treatment primarily in law, planning, and policy theory scholarship. Empirical analyses of NEPA effectiveness are extremely scarce, presumably due to the size and complexity of NEPA documents. The analytical unmanageability of

NEPA documents and its resulting void of study are symptoms of NEPA's legalistic implementation.

While empirical study of NEPA remains to be attempted, much can still be gained through critical analysis and synthesis of various qualitative data sources related to NEPA. This research effort will utilize such sources to examine the role of CEQ in fulfilling NEPA's comprehensive planning and policy charge represented in Title II. Two primary research questions are the focus of this work. The first question is: "What impediments prevent the achievement of NEPA's rational comprehensive focus?" The second question is, "How might NEPA resume this comprehensive focus?" Content analysis of legal case studies, legislation, and policy research are used to answer both research questions.

Chapter Two provides a concise legal history of NEPA. This history demonstrates that much of NEPA implementation has occurred incrementally through various court decisions in the federal judiciary. The resulting body of NEPA case law reflects the difficulty courts have had in identifying and enforcing operative components of the larger Act.

Chapter Three presents an analysis of NEPA's administrative history in the context of planning and policy theoretical models. This literature reveals a fundamental tension in NEPA between its rational comprehensive formulation and incrementalist-legalist implementation. While NEPA aims to be comprehensive in scope, it is constrained by a project-level focus that has resulted from 1) legalistic implementation and 2) gradual erosion of the long-term planning functions of CEQ. Etzioni's mixed-scanning model, incorporating both comprehensive and incremental decision-making, is

presented as a framework which, if followed, could provide NEPA with operative balance.

Chapter Four analyzes a series of efforts to develop a national system of ecological indicators. Though such a system has not been achieved at present, these reports and initiatives aimed at prompting the federal government into action provide evidence of the need for comprehensiveness in environmental information. These proposals also confront the political and institutional challenges associated with comprehensive environmental planning and policy.

Chapter Five proposes a modest informational product which could be adopted by CEQ. This product is comprehensive in scope, synthesizing 1) a national land use and ecosystem classification inventory with 2) Ecological Footprint analysis. This product has the potential to operationalize several Title II ambitions. Though this product is very unlikely to impose any formal legal constraints on agency actions, it surely provides utility as a framework for deeper understanding of project impacts.

Chapter Six summarizes the larger analysis and offers concluding thoughts on the future of NEPA's comprehensive mandate.

## Chapter 2: Concise Legal History of NEPA

### The Contribution of NEPA to National Environmental Policy

The passage of the National Environmental Policy Act on January 1, 1970 was a watermark in environmental science, politics, and activism. Its passage triggered a flurry of subsequent environmental laws throughout the 1970s in areas such as water, air, and species protection. The buildup to NEPA occurred during the 1960's as focusing events such as the publication of *Silent Spring* and burning of the Cuyahoga River evolved into a mass public movement which pushed the government to action. Though the rise of the environmental movement in the 1960's and its federal legislative victories in the 1970's have been well-documented, a brief discussion of federal administrative practices in areas of resource development and the environment prior to NEPA provides necessary perspective on NEPA's importance and transformative effect.

An early and relevant treatment of oversized federal authority was Walter Maas's "Muddy Waters: The Army Engineers and The Nation's Rivers". Written initially as a doctoral dissertation and widely published in 1951, this work provides both a history and critical analysis of the U.S. Army Corps of Engineers over several decades leading up to WWII. In it, the Corps is presented as a monolithic federal institution of unchecked and corruptive power. Maas describes a political culture characterized by federal pork barrel spending and opaque log-rolling by Corps leadership and powerful legislators in key committee leadership positions. Costly water development projects of questionable infrastructure importance or economic benefit were awarded to local areas largely on the basis of political connections rather than national need. Maas contrasts this culture of insider deal-making with the progressive agenda of the Roosevelt administration seeking

expert, rational administration of government for widest public benefit. Many of the strongest condemnations of the Army Engineering Corps come in the foreword from past Roosevelt Interior Secretary, Harold Ickes:

One way to describe the Corps of Army Engineers would be to say that it is the most powerful and pervasive lobby in Washington. The aristocrats who constitute it are our highest ruling class. They are not only the political elite of the army, they are the perfect flower of bureaucracy. At least, this is the reflection that their mirrors disclose to them. Within the field that have elected to occupy, they are the law – and therefore above the law. (Maas 1951, ix)

While environmental concerns as a public policy issue or formal academic pursuit had been scarcely articulated at the time of Maas' writing and were not mentioned in this work, his analysis provides a window into the closed nature of federal decision-making at the time. It was this sort of decision model, which valued a short list of economic benefits — irrigation, flood control, hydropower — above conservation, recreation, or other emerging interests. In later years, the legacy of many Corps projects would pose ongoing resource management challenges for federal bureaucrats not just in the engineering area, but also in fish, wildlife, and water quality management.

The U.S. Army Corps of Engineers hegemony over a particular area of resource and economic development was not exclusive to the federal bureaucracy. A broad critique of the relationship between government regulators and the industries they regulate was offered by University of Chicago economist George Stigler in 1971 article, "The Theory of Economic Regulation". This article is timely in the context of NEPA in that it describes the pattern of government regulation in the decades leading up to 1970.

Stigler provides compelling empirical evidence to support his assertion that state regulatory agencies initially created to act in the public interest in many instances actually come to act on behalf of the economic or special interests that the agency is charged with regulating. The formal economic theory posited by Stigler to describe this situation is termed “regulatory capture”. Regulatory capture occurs when groups or individuals with a large stake in a policy or regulatory decision exert intense pressure to affect policy outcomes which benefit them. The rest of the public, who individually have much smaller relative stakes in the policy, have no incentive to mobilize and may tend to ignore the policy process. Agencies which have succumbed to such pressures are termed “captured agencies”. Policies formulated and administered by captured agencies often produce negative externalities.

Many pollution problems are classic examples of negative externalities in which the true costs of an economic transaction are not born by producer or consumer, but by society. Prior to NEPA and subsequent federal legislation, there was no legal mechanism which required even the modest steps of acknowledging or studying these negative externalities. Pollution was viewed as a cost of economic growth that could not be managed in the project design or modification stages and must be accepted as an unavoidable byproduct of industrial activity. NEPA required that any project with a federal connection investigate its potential negative externalities and explicitly admit a causal linkage between projects and environmental impacts.

Commons problems were also an outcome of regulatory capture. Extractive industries operating on public lands exerted considerable influence on agencies such as the Bureau of Land Management and United States Forest Service. The priorities of

agency leadership were often much more closely aligned with the economic values of industry than conservation values. The theory of regulatory capture very closely explains why such a situation is commonplace. As these industries had a very large stake in grazing, mining, and timber policies, they exerted much influence on agencies to adopt liberal policies. Agency staffs were often composed of former industry workers or later left to work with these firms. Considering that most of this activity took place on remote lands in the Western United States, very few members of the public were even aware of those policies and practices which resulted in overuse of public resources. The nation's constant need for fiber, minerals, fuel, and lumber to fuel growth overshadowed conservation as a management goal. Thus, the pressure exerted by nascent environmental groups could not come close to matching that exerted by extractive industries.

Writing at the same time, political scientist George Wandesforde-Smith echoed many of Stigler's concepts but placed them in an environmental context. Wandesforde-Smith attributed much of national resource management policy since the birth of the Nation to be the result of laissez-faire economics and a national ethos of individual reward for individual initiative (Wandesford-Smith 1970, 205). These cultural traditions led federal oversight on the environment to be limited and value economic uses above all others. What changed this status quo, he argues, was the rise of the progressive ideal during the 1930s under Roosevelt and again in the 1960s under Kennedy and, later, Johnson. This ideal saw unfettered free market activity not as a panacea, but rather as a potential threat capable of damaging society. Government not only was capable of solving societal problems that the market could not, but it had an ethical responsibility to act on behalf of underrepresented interests. The broader political climate and

transformative character of 1960s allowed for an equally transformative shift in national thinking on environmental stewardship and conservation. The government must not present itself as neutral arbiter between competing economic and political interests, rather, it must take a more active role in defending the Nation's environment from exploitation.

It is these intersections of political culture, demonstrated agency bias toward industry, an evolving environmental policy discourse, and the perception of a national problem which both necessitated and allowed the passage of NEPA. John Muir, Aldo Leopold and others had been contributing quite productively to a growing field of ecology for several decades, yet NEPA was the first law to ever institutionalize ecological considerations. While later chapters will present a critical examination of NEPA's evolution over forty years, the change it produced in how the federal government administers programs, regulates damaging or dangerous activities, and uses information must not be casually ignored. These changes were positive and are an example of government openly and honestly confronting the coercive nature of its own unchecked power. In this sense, NEPA is consistent with the Nation's earliest democratic values and the adoption of institutional mechanisms to safeguard these values.

#### **Four Current NEPA Perspectives**

NEPA's most notable requirement — the EIS process as outlined in Section 102(2)(c) of the Act — has over time become the battleground for both proponents and opponents of federal actions affecting the environment (Bartlett, R.V. 1999) As Section 102(2)(c) sets a legally-enforceable mandate of analysis and review for federal agencies,

the actions of federal agencies in satisfying this requirement are frequently challenged in the court system. The possibility of lengthy legal disputes has resulted in many EISs becoming complex and voluminous documents, written to withstand possible legal challenges. This has made the EIS process a costly, time-consuming endeavor which some developers and agencies view as a thing to be avoided. Conversely, segments of the environmental community view the EIS as a useful obstructionist tool, capable of delaying or killing controversial projects.

Karkainen (2004) identifies four general perspectives on NEPA and its effectiveness. He describes the holders of these four perspectives as: “NEPA optimists, NEPA monkey wrenchers, NEPA skeptics, and NEPA legalist critics” (Karkainen 2004). The categories are not mutually exclusive, and some NEPA practitioners may identify with multiple categories or even all four. Members of the first category, NEPA optimists, contend that NEPA is largely fulfilling its congressional mandate. NEPA optimists believe that the Act’s public participation requirements have been fulfilled and have led to greater democracy, transparency, and citizen input on federal actions. NEPA optimists also put great stock in NEPA’s ability to produce rational, informed decision-making.

Conversely, NEPA monkey wrenchers tend to be skeptical of the quality of information produced by impact analyses. Monkey wrenchers assert that the alternatives analysis process in NEPA is neither rational nor free from agency bias. The selection of project alternatives for analysis is inherently value-driven and often involves exclusion of those alternatives favored by citizens and environmental interest groups. Despite these suspicions, monkey wrenchers view NEPA as an important piece of environmental

policy. Its importance is derived from its use as a legal mechanism that can slow or stop unfavorable projects. The onerous requirements of a full scale EIS may be enough to stop a project before it ever leaves the figurative drawing board. The threat of bureaucratic delay wielded by NEPA monkey wrenchers may be enough to get them a seat at the table and a position to influence project modification or selection of alternatives.

NEPA skeptics hold the countervailing position of monkey wrenchers. Skeptics view NEPA as an oversized “paperwork exercise” that accomplishes little, but requires much in terms of cost, time, and other resources (Karkainen 2004, 340). They resent the power that NEPA gives to special interests, i.e., monkey wrenchers, and consider this undeserved special interest influence to be anti-democratic. NEPA skeptics tend to be agency personnel overseeing extractive industries that operate on federal land. Such agencies include the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). These agencies are often on the receiving end of project delays and cancellations, thereby confounding their institutional charge.

A fourth perspective, that of NEPA legalist critic, also takes a mostly negative view of NEPA, specifically the extent to which its implementation has been mishandled by the federal judiciary. This viewpoint maintains that NEPA exists as a paper tiger that has become heavy on process, but light on substance. A series of unfavorable court decisions have incrementally weakened NEPA’s influence and given increasing amounts of discretion and authority to agency managers. This situation is typified by the U.S. Supreme Court’s record on NEPA cases. Environmental interest groups have never won a single NEPA case before the high court (Karkainen 2004, 342).

A more in-depth exploration of the NEPA legalist critic's perspective is essential in understanding broader NEPA criticisms. Out of Karkainen's four NEPA perspectives, three perspectives can be seen as a direct outcome of NEPA's procedural and documentation requirements. The NEPA monkey wrencher views these requirements as a positive obstructionist tool, while NEPA skeptics and legalist critics view them as a negative exercise in paperwork generation. Upon even a cursory reading, one can infer that NEPA surely was not intended solely as means of creating lengthy government documents. As mentioned earlier, NEPA aims to promote a new environmental ethic in both process and action (Bartlett, H. 2000; Bartlett, R.V. 1986a, 1986b, 1999; and Caldwell 1997, 1998). The struggle to define NEPA as having primarily substantive requirements versus primarily procedural requirements will characterize NEPA's interpretation by the courts and implementation by agencies.

### **An Initial Substantive Mandate**

In the years immediately following its passage, NEPA was interpreted as having substantive provisions that would require agencies to take specific action based on the outcomes of an EIS review. Both Bartlett (2000) and Pearson (2008) cite the decision in *Calvert Cliffs' Coordinating Committee Inc v. United States Atomic Energy Commission* (449 F2d 1109, D.C. Circuit, 1971) as an affirmation of NEPA's substantive mandate.

Judge Skelly Wright, writing for the majority, concluded:

What possible purpose could there be in the Section 102(2) (C) requirement (that the "detailed statement" accompany proposals through agency review processes) if "accompany" means no more than physical proximity — mandating no more than the physical act of passing certain folders and papers, unopened, to reviewing officials along with other

folders and papers? What possible purpose could there be in requiring the “detailed statement” to be before hearing boards, if the boards are free to ignore entirely the contents of the statement? NEPA was meant to do more than regulate the flow of papers in the federal bureaucracy. The word “accompany” in Section 102(2) (C) must not be read so narrowly as to make the Act ludicrous. It must, rather, be read to indicate a congressional intent that environmental factors, as compiled in the “detailed statement,” be considered through agency review processes. (449 F2d 1109, D.C. Circuit, 1971)

The Calvert Cliffs opinion determined that substantive review would not rigidly prescribe a specific course of agency action in “particular problematic instances,” but would create a “strict standard of compliance” applicable to most projects (449 F2d 1109, D.C. Circuit, 1971). A thorough and comprehensive analysis of project impacts and alternatives should be conducted. This analysis should be reflected in the agency’s action to proceed with or modify the project to minimize environmental impact. The process should be more than just a “pro forma ritual,” but rather “a full exercise of substantive discretion” (449 F2d 1109, D.C. Circuit, 1971). This legal interpretation is consistent with NEPA’s intent. NEPA aims to “achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life’s amenities” (NEPA, 101(b)(5)). NEPA does not intend to prohibit or discourage resource use; rather, its intent is to merely structure this use in ways that consider the environment and availability of resources for future generations. Environmental concerns do not automatically trump quality-of-life or economic concerns; all concerns must be balanced alongside each other. This standard of substantive review continued to mature through decisions of the lower federal courts for several years until 1976 (Bartlett, H. 2000).

## Shift from Substantive to Procedural Interpretation

What little crack *Calvert Cliffs* opened in giving agencies discretion over what constitutes an acceptable level of substantive project review, U.S. Supreme Court decisions successively widened to the point of fracture. Bartlett (2000) identifies the erosion of substantive review as having taken place over a progression of four U.S. Supreme Court verdicts, beginning in 1976 with *Kleppe v. Sierra Club American Electric Power System* and ending in 1989 with *Robertson v. Methow Valley Citizens Council* (Bartlett, H. 2000). The ruling in *Kleppe*, one of the first NEPA cases to reach the U.S. Supreme Court, rejected the Sierra Club's attempt to enjoin the Department of Interior (DOI) from leasing large areas of Wyoming's Powder River Basin to coal mining. The Sierra Club argued that the leasing scheme violated NEPA because no programmatic EIS, which would have analyzed the cumulative impacts of numerous scattered mining leases on a regional scale was conducted. In its verdict, the Court gave the DOI wide latitude in determining the necessity of such an EIS and ordered that agencies only need take a "hard look" at the environmental impacts of a project (427 US 390, U.S. Supreme Court, 1976). The implication of the ruling was that a "hard look" may fall well short of a comprehensive look.

The hard look rule would persist in important NEPA cases that followed, including *Vermont Yankee Nuclear Power Corp v. Natural Resources Defense Council* (1978), *Stryker's Bay Neighborhood Council, Inc. v. Karlen* (1980), and would eventually culminate in *Robertson v. Methow Valley Citizens Council* (1989) (Bartlett, H. 2000, 414). *Robertson* effectively shut the door on substantive review and ushered in

NEPA's current conception as a solely procedural act. In strong language, the decision's opening paragraph reads as follows:

1. NEPA does not impose a substantive duty on agencies to mitigate adverse environmental effects or to include in each EIS a fully developed mitigation plan. Although the EIS requirement and NEPA's other "action-forcing" procedures implement that statute's sweeping policy goals by ensuring that agencies will take a "hard look" at environmental consequences and by guaranteeing broad public dissemination of relevant information, it is well settled that NEPA itself does not impose substantive duties mandating particular results, but simply prescribes the necessary process for preventing uninformed — rather than unwise — agency action. (490 US 332, U.S. Supreme Court, 1989)

Taken in sum, these four cases represent an about-face from the ruling in *Calvert Cliffs* and, as such, a stark reversal of precedent.

As a result of these verdicts, legal challenges to the procedural requirements of Section 102(2)(c) have become the primary and, some might argue, sole means for enforcing the Act (Bartlett, R.V. 1999, 63). Federal agencies do not have an explicit legal requirement to select project alternatives with less environmental impact nor modify project proposals to reduce impact. Thus, NEPA is criticized as having rigorous, even exhaustive procedural requirements, but few substantive requirements. In effect, the judicial system has become the primary watchdog for NEPA process and a varied body of case law has evolved which has simultaneously clarified and complicated the application of NEPA to federal projects. Justice Thurgood Marshall wrote of NEPA in his dissenting opinion in *Kleppe v. Sierra Club*:

In fact, this vaguely worded statute seems designed to serve as no more than a catalyst for development of a "common law" of NEPA. To date, the

courts have responded in just that manner and have created such a “common law.” Indeed, that development is the source of NEPA’s success. (427 US 390, U.S. Supreme Court, 1976)

While the creation of this body of NEPA common law may have been well intended, legalist critics argue that leaving the details of NEPA’s application and enforcement to the federal judiciary falls short of the Act’s intent. While NEPA falls squarely in the realm of federal administrative law and the courts were surely intended to play a role in evaluating agency compliance, NEPA’s policy intent was not just to serve as a procedural legal hurdle (Caldwell 1997, 1998).

### **Positive Law and NEPA**

What complicates NEPA implementation in our legal system is what confounded Justice Marshall: the statute’s “vaguely worded” language. Murphy (2005) argues that courts function most coherently and consistently when asked to evaluate compliance with specific rules and rule-making powers. This belief is represented by the philosophy of legal positivism. Positive law is court-enforced law created by a sovereign power. Positive law is clear, specific, and enforceable. Positive law distinguishes itself from natural or moral law, which legal positivists view as too general, open to conflicting interpretations, and difficult to enforce. Murphy gives the example of stealing from one’s neighbor. Moral law forbids coveting her possessions; positive law only forbids actually stealing them (Murphy 2005).

In contrast with other national environmental policies such as the Clean Air Act, Clean Water Act, or Endangered Species Act, NEPA is not a regulatory Act. It does not identify objectively measurable physical parameters of importance and then set a

threshold value for legal compliance. As outlined above, NEPA case law has declared that the Act's dominant requirements are procedural: federal agencies must adhere to a process, presumably performed in good faith. NEPA does not require this process to produce a specific outcome, but hopes to create an ethic of environmental responsibility. Such an ethic can be considered a form of natural law. This absence of clear, enforceable outcomes in natural law, generally, and NEPA, specifically, makes judicial interpretation subjective and complex. Each unique project necessarily requires its own unique process of data gathering and analysis. As such, every project is potentially litigable on the grounds that the process used did not adequately satisfy NEPA's procedural requirements. The response to this threat of litigation is often more process: more data collection, more alternatives analyzed, and the preparation of documents that are greater in scope, length, and detail to avoid legal challenge.

### **Alternative NEPA Processes and the Future**

In recent years, agencies have responded to this documentation burden by circumventing the EIS process in favor of less rigorous process. NEPA states in section 102(2)(c) that the EIS process applies to those "major federal actions significantly affecting the quality of the human environment" (NEPA 1969). Similar to the inconsistencies discussed above with regard to procedural vs. substantive review, determinations of project significance have also been subject to various judicial interpretations. A major area of inconsistent ruling as it relates to NEPA is on the issue of Environmental Assessments (EA) and Findings of No Significant Impact (FONSI). The CEQ created EAs to cover a middle-ground of project which cannot yet be classified

as significant, but does not qualify for a categorical exclusion. Before the EIS process is triggered, a shorter EA is required which determines environmental significance. If a project is environmentally significant, it must follow the EIS process. If not significant, a “Finding of No Significant Impact (FONSI)” is reached. The original intent of an EA was therefore to serve as a scoping mechanism that would reduce documentation requirements and administrative burden in appropriate projects. Complicating this process is the fact that the term “significant” has never been rigorously defined in NEPA itself or by CEQ regulation (Karkkainen 2002, 919). NEPA optimists argue that this broad definition is one of NEPA’s strengths: the Act does not constrain the range of environmentally significant federal actions to a finite list of parameters; it potentially covers all actions. As already established, however, the courts have difficulty adjudicating non-positive law and have given agency managers much discretion in determinations of significance. When their judgments conflict with the priorities of conservationists, NEPA monkey wrenchers enter these disputes and they proceed to the courts.

The evolving and increasing use of “mitigated FONSI” adds another layer of complexity to agency and judicial determinations of project significance. A mitigated FONSI is possible “when a preliminary version of an EA indicates that environmental effects of a proposal are potentially significant, but, with mitigation, can be reduced to less than significant levels” (Bass et al. 2001, 57). Firms and agencies understandably want their projects to proceed at least cost in the quickest timeframe possible. As discussed, EIS documentation is a long, costly process with large research, analysis, and public involvement requirements. A mitigated FONSI can be a means of cutting time

and cost in those projects with borderline significant impacts. When used in good faith, this third alternative to the two regulatory tracks of EA → FONSI or EIS can be positive and result in greater government efficiency. It should be noted that the EIS process does not require mitigation nor does it require selection of the alternative with least environmental impact. As stated in the *Methow* opinion, the EIS process merely prevents uninformed agency decisions, not unwise ones. When used in good faith, the EA → mitigated FONSI process also encourages agency consideration of and responsibility for environmental impacts at an earlier stage of project design (Karkkainen 2004, 348).

Alternatively, a mitigated FONSI can create the potential for agency abuse and violation of NEPA's intent. Public involvement is not a requirement of the EA → mitigated FONSI process. EAs have no formal public scoping process (Eccleston 2008, 168) and only 38% of agencies have procedures for public involvement (Solomon et al. 1997, 266). This lack of public transparency is contrary to the spirit and essential function of NEPA. While Chapter Three will delve more deeply into political interference with NEPA, it must be understood that NEPA's drafters designed its public involvement requirements as an institutional check on government's ability to undermine, evade, or ignore the Act. Caldwell writes of the importance of this check shortly after NEPA's passage in 1973:

The drafters of NEPA had no naive illusions as to the readiness of the agencies to comply with the intent of the Act. It was assumed that the agencies would be readier to employ 102 procedures to protect their missions, programs, and projects from modification on behalf of environmental quality. There could be no certainty as to the willingness of the Executive to enforce compliance with the Act. An alternative to Executive enforcement was therefore provided in opening the decision-processes of the agencies on environmental issue to public scrutiny by reference to the Public Information Act (Caldwell 1973, 167).

Thus, a meaningful public involvement component can be considered an essential operative component of the Act and its implementation. The erosion or elimination of this component is a significant diminution not just of NEPA's ambitions, but its everyday function.

Mitigated FONSI's also lack uniform standards for review which can allow agency institutional biases to influence the EA process (Davis 2006 and Karkkainen 2002). In the EIS process, the final impact statement is filed with the Environmental Protection Agency (EPA). EPA reviews this document for glaring problems which might be damaging to public health, welfare, or environmental quality. EPA concerns are then documented and provided to the CEQ. The CEQ may or may not choose to take action on these concerns. On this basis, EPA's role in the EIS process has and continues to be a limited one, but it is important to make the distinction that in the EA process, EPA has no role when not acting as a lead agency.

The Fifth Circuit Court of Appeals case of *Spiller vs. White* (2003) involved a project for which EPA was acting as a co-lead agency, along with the U.S. Department of Transportation, in a FONSI determination. This judgment yielded precedent which suggests that even when involved as a lead agency, EPA may exercise considerable discretion in determining whether to apply NEPA through the EIS or EA process. The case related to the re-use of a 225,000 gallon per day gasoline pipeline across Texas which had been offline for several years. Plaintiffs argued that the project should have been subject to a full scale EIS and that the decision of the lead agencies to pursue the alternate EA → mitigated FONSI process was arbitrary, capricious, and, thus, a violation

of NEPA. The Fifth Circuit did not agree and upheld the verdict of the district court, writing:

As we noted earlier, NEPA does not guarantee any substantive results; all it ensures is that a particular process will be followed. Herein lies the problem for the Collins plaintiffs. They really don't want more process. Indeed, considering the extensive and comprehensive nature of the EA conducted here, it is unclear exactly what more process would involve. What they really desire is a substantive result: convinced that it poses a great threat to the health and safety of its citizens and the environment in general, the Collins plaintiffs want this pipeline project killed. Unfortunately for their case, and whatever of the merits of that position, this outcome cannot be secured in this federal court proceeding. The Lead Agencies here have complied with the NEPA statute and its accompanying regulations in every way. They have conducted an exhaustive assessment of the environmental effects of this proposed pipeline and, after consideration concluded that those effects were not significant (352 F. 3d, 5th Cir. 2003).

The final EA document was 2,400 pages in length and included 6,000 written comments from 6 public meetings. (Davis 2006, 42) The developers and lead agencies did complete a process which reflected at least the appearance of due diligence. What is troubling about their process, however, is the implication that all of the analysis, public input, and documentation were simply produced to support a foregone conclusion, a *pro forma* exercise. They began from an assertion that the project would have no significant impact, then worked backward in a sort of NEPA-esque process to support that result through public involvement and extensive documentation. Accordingly, this verdict can be considered as a step backward in providing necessary clarity on the issue of FONSI determinations. These determinations must be made as a *result* of process and not as its starting point. Any other application of NEPA process fails to comply with its legislative charge and denies the spirit of its intent.

The federal judiciary has, thus, yielded considerable discretion to agencies on both the content and application of NEPA. In the first two decades of its existence, the U.S. Supreme Court effectively reduced NEPA to a single procedural requirement in a single line — section 102(2)(c) — out of a 3,000 word bill. The reduction of NEPA to procedural compliance with 102(2)(c) can be understood in the context of positive law. Courts perceived this section as the only aspect of the bill which could be enforced. In order to satisfy a court’s “hard look” test, agencies must only prove that they followed a process. Both the level of rigor involved in the EIS process and the extent to which it influences outcomes are left to the agency discretion. A determination of adequate process tends to be viewed through a limited, project-specific lens. Thus, the “hard look” test for section 102(2)(c) is opaque. It needs a level of consistency, transparency, and visibility that applies to all agencies.

In recent years, courts have even undermined the EIS procedural requirement. The *Spiller* verdict established precedent that gave agencies discretion over definitions of significance and suggested the EIS process can be optional. This development does not bode well for NEPA’s future and continues the trend of NEPA being a statute that is difficult to implement in accordance with its policy intent.

## **Chapter 3: NEPA Administrative History and Theory**

While it is appropriate to begin an examination of NEPA with its legal history and the federal judiciary's shift from a substantive to procedural interpretation of NEPA, this tension between process and outcome is not limited to a single branch of government. It must also be understood that just as the courts have struggled to interpret and implement NEPA, so has the bureaucracy. Three classic and competing streams in planning and policy theory offer useful frameworks for study of NEPA implementation by the Executive branch. As drafted, NEPA can be viewed as an example of the rational comprehensive model described by Simon (1946). As applied, NEPA is an example of the incremental model described by Lindblom (1959). This divergence between conception and application results in scattered implementation of NEPA, inconsistent with its policy intent and variable in terms of success.

### **Planning and Policy Theoretical Models**

#### **Rational Comprehensive Model**

The rational comprehensive model has been a centerpiece in planning theory and practice since its early description by Herbert Simon in his classic 1946 article, "The Proverbs of Administration." Rationalism is characterized by its reliance on science, claims to objectivity, and emphasis on determining single, optimal solutions which represent greatest net social benefit or "greatest good for all" (Smith and Larimer 2009). NEPA rests squarely in this tradition with its emphasis on interdisciplinary science, analysis of alternatives, and comprehensive scope. Although often criticized for its flaws and attributed as the cause of many failed plans and policies, rationalism persists, if

only as an ideal to be pursued. Even in his early writings, Simon anticipates this criticism by arguing that rationalism has obvious and consequential limits. Bounded rationalism acknowledges that perfect rationalism is never achievable; it is constrained by skills, values, and knowledge/information (Simon 1946, 64-65). While his early writings relate primarily to the limits of the individual, Simon's later writings identify specific forms of rationalism and put individual limits in the context of institutions, processes, and politics.

Simon's 1985 article, "Human Nature in Politics: The Dialogue of Psychology with Political Science", parallels NEPA's tug-of-war between substantive and procedural law. Simon identifies substantive and procedural rationality as two distinct forms of rationality. He acknowledges that his terms are borrowed from constitutional law and consistent with legal definitions of substantive and procedural due process. Thus, rationality may be achieved through either a rational decision (substantive) or a reasonable process of decision-making (procedural). The defining character of substantive rationality is its objectivity: the arrival by a judge or administrator at an objectively optimal choice. In this respect, substantive rationality is decidedly unbound: a decision is either optimal or it isn't and true optimality can only be achieved through the inclusion of all variables and considerations. Conversely, the defining feature of procedural rationality is its subjectivity. Subjectivity and context erect firm bounds to perfect rationalism and influence the actions of public administrators. Simon writes:

To deduce the procedurally or boundedly rational choice in a situation, we must know the choosing organism's goals, the information and conceptualization it has of the situation, and its abilities to draw inferences from the information it possesses. We need know nothing about the objective situation in which the organism finds itself, except insofar as that situation influences the subjective representation. (Simon 1985, 294)

In this regard, Simon has put the administrator in the context of an imperfect, political, and information-limited institution. An administrator utilizing procedural rationality is influenced by three things: values, information held, and usability or relevance of that information. This description presents a more realistic picture of administrative decision-making and the federal bureaucracy. In this portrayal, information is currency. How information is used and sought is not perfectly rational nor objective; information is used, misused, or disused in furtherance of individual and institutional agendas. As has been discussed, the weight of NEPA's implementation tends to vary by agency and/or Presidential administration. The justification for a particular approach to NEPA is often based on inclusion, selective omission, or emphasis of key information. Using the pipeline project adjudicated in *Spiller v. White* as an example, agency managers successfully shifted the informational focus of analysis away from significance of impacts toward adequacy of mitigation. This is a strategy repeated in other recent NEPA cases which subtly changes the informational needs of a project analysis from environmental damage to environmental restoration. Environmental restoration as a starting point implicitly accepts that environmental damage will occur and, as such, symbolizes an early concession to environmental damage, contrary to NEPA principles.

While Simon has offered a general description of administrative decision-making, it is a description that can be almost perfectly superimposed on NEPA as ideal and NEPA as real. Substantive rationality may describe the NEPA that its drafters hoped to produce, however, procedural rationality describes that NEPA that has evolved. More broadly, Simon's article highlights the futility of those who would scrap the rational model entirely. In response to criticisms of the rational model, a more useful exercise for both

academicians and administrators is to recognize its limits. A more qualified understanding of administrative rationality is needed when studying policies such as NEPA which have roots in the rationalist tradition. Simon's procedural rationality, as distinct from substantive rationality, puts NEPA in a more detailed and current context. Procedural rationality also introduces the notion of values or normative bias and the importance of information in administrative decision-making. The role of information in NEPA processes is a primary focus in this analysis. Though some of its criticisms may be valid, rationalism maintains its importance in this analysis and other serious discussions of planning and policy theory. And, as will be developed throughout this chapter, bounded rationalism is an apt and useful conceptual model for understanding NEPA.

### **Incremental Model**

The response of planning and policy theoreticians to the rational model was the incremental model. While rationalism is comprehensive in scope and at least in its early forms claimed a sort of neutral, objective detachment, incrementalism is measured in effect and referential in analysis. The counterweight to Simon's classic 1946 article on bounded rationality is Charles Lindblom's 1959, "The Science of 'Muddling Through.'" In it, Lindblom decries elite, expert decision-making as anti-democratic and argues for a slower, more participatory, cautious approach to policy change. He argues radical change in a democracy is neither preferable nor predictable in its effects. Past policy sequences must be referred to and built upon in subsequent policy steps because past policies contain the lessons of success and failure. To ignore this body of knowledge is

reckless and leads to poor policy solutions. In Lindblom's ideal policy environment, a broad array of citizen and interest groups slug it out until one policy proposal emerges victorious or incorporates elements of other proposals to reach a deliberated compromise.

NEPA's legal history certainly follows in the tradition of a competitive, adversarial policy environment that Lindblom describes. Lindblom elevates the role of the "watchdog" in society, writing: "And these watchdogs can protect the interests in their jurisdiction in two quite different ways: first, by redressing damages done by other agencies; and, second, by anticipating and heading off injury before it occurs" (Lindblom 1959, 85). Lindblom's "watchdogs" are, thus, analogous to Karkainen's "monkey-wrenchers." Watchdogs should not be construed strictly as those representing environmental interests, but also as those representing the economic and corporate interests which oppose them. One side serves as guardians for the environment while the other serves as guardians for commerce and economic growth. In Lindblom's democratic forum, these various interests must conflict with and check each other to arrive at plans and policies which — he argues — therefore represent the best interests of society.

The legal scholarship and case studies presented above show NEPA as a fertile battleground for ongoing legal wrangling. Recent cases suggest a trend toward gradual erosion of NEPA's congressional mandate both in Section 102(2)(c) and the broader statute. The essence of this progression is its incremental character. The creation of a body of NEPA "common law" as envisioned by Justice Marshall in *Kleppe* has certainly been actualized. The creation of a body of common law can be seen as the most incremental of all government policy processes. Common or case law is perfectly consistent with Lindblom's definition of incrementalism as a process of "successive,

limited comparisons” (Lindblom 1959). The defining feature of common law is the importance of legal precedent and its influence in binding future legal decisions. No decision can be made without a thorough analysis of all relevant prior decisions.

Verdicts must be consistent with prior decisions and drastic, unexpected changes in court decisions are rare by design. NEPA’s emphasis on procedural compliance with Section 102(2)(c) – a single line out a 3,000 word bill – did not happen immediately upon passage of the act; it slowly developed out of legal conflict, evolving precedent, and specific language in NEPA that courts could make operative. Much of the statute’s language could not be made operative by the courts.

### **Mixed-Scanning Model**

Limitations of both the rational and incremental models eventually produced a third planning theory stream that finds a middle path. This third theory is presented in Amitai Etzioni’s 1967 article, “Mixed Scanning: A ‘Third’ Approach to Decision-Making.” In it, Etzioni is critical of rationalism’s false claims of value-neutrality and comprehensiveness, echoing incrementalist concerns. He argues that comprehensiveness is not possible due to both the bounded cognitive capacities of administrators, as well as the finite resources of administrative institutions. In developing or implementing a policy solution, decision-makers must allocate finite resources based on their own understanding of a problem. This process of problem definition includes some problem variables while necessarily excluding others. Administrative manageability is not possible without decisions of scope and priority. Furthermore, this process of inclusion or exclusion also must relate to individual and/or institutional values. Certain considerations are deemed

worthy of attention and treatment while others are not. This selection is itself a normative process.

Etzioni offers two central criticisms of incrementalism. First, incrementalism resists innovation, threatening to trap policy makers and administrators in a business-as-usual mindset. Intractable problems which require a novel approach are shortchanged because acceptable solutions must be derivative of past solutions, which, in the case of a persistent problem, have all failed. Etzioni's second criticism is that incrementalism contains a rudderless, "drifting" quality of "action without direction" (Etzioni 1967, 388). Numerous, small, remedial policy actions should not simply be evaluated as separate units in the context of recent patterns; these actions must also be evaluated in aggregate as forming a trend and a single unit of analysis. A tradition of seemingly measured, benign decisions may, as a body, produce effects that were unexpected or unintended when the scale of analysis is broadened. The interconnected nature of some problems certainly describes many modern environmental problems. Global warming, overharvest of marine fisheries, and hypoxia in the northern Gulf of Mexico are all examples from a much larger list of broad-scale ecological problems that require systemic, integrated analysis of numerous, fragmented policies and policy steps. NEPA aims for this comprehensive scope of analysis, referring to "the interrelations of all components of the natural environment" in its very first sentence (NEPA 1969).

Etzioni's answer to the shortcomings of both rationalism and incrementalism was to propose a classic "middle way" solution, whereby useful elements of both models would be fused to create a new one. This approach – "mixed scanning" – has mutually-informing and reinforcing micro- and macro-orientations. The central characteristic of

mixed scanning is the relationship between its two components of “(a) high-order, fundamental policy making processes which set basic directions and (b) incremental ones which prepare for fundamental decisions and work them out after they have been reached” (Etzioni 1967, 385). Etzioni lists various benefits of the mixed-scanning approach. First, it “provides a particular procedure for the collection of information.” Second, it “provides a strategy for evaluation” of past, present, and proposed actions. And third,

...each of the two elements in mixed scanning helps to reduce the effects of the particular shortcomings of the other; incrementalism reduces the unrealistic aspects of rationalism by limiting the details required in fundamental decisions, and contextuating rationalism helps to overcome the conservative slant of incrementalism by exploring longer-run alternatives (Etzioni 1967, 390).

Etzioni’s description of the strengths of mixed scanning can be distilled to two main points: 1) systematized, prioritized information collection and evaluation 2) a balance between short-term, politically-influenced policy priorities and long-term, rational concerns. In these respects, mixed-scanning bears considerable resemblance to Simon’s procedural rationality. Both theoretical models stress the importance of information to the planner or administrator, as well as varying and competing normative pressures which she is under.

Just as Simon’s procedural and substantive rationality shed much light on NEPA as ideal versus NEPA as real, Etzioni’s theoretical framework can also be applied quite directly to gain insight on NEPA. The NEPA statute contains two distinct sections – Title I and Title II – that classify its mandate by size and scope. Title I largely describes those requirements federal agencies must follow in considering the impacts of specific

projects or policies. Title II creates a coordinating institution in the EOP, the CEQ, which is charged with both oversight of Title I compliance by agencies, as well as a broad mandate to monitor “the status and condition of the major natural, manmade, or altered environmental classes of the Nation” (NEPA 1969). In both respects, NEPA can be considered an example of a mixed-scanning approach to planning and policy. Title I relates to specific, incremental agency actions while Title II relates to the understanding and protection of the Nation’s environment as a whole, integrated system. Thus, the creation of CEQ signifies – using Etzioni’s terminology – a fundamental policy decision. This decision declares ecological health a national priority and CEQ as its safeguard.

### **CEQ History**

The extent to which CEQ has fulfilled its legislative charge is questionable. The writings of Dr. Lynton Caldwell, NEPA’s drafter, offer a well qualified assessment of CEQ in the decades following its creation. In various essays, Caldwell asserts that the courts do not deserve full blame for NEPA’s largely legalistic interpretation; this blame must be shared with the Presidency and its lack of support for CEQ (Caldwell 1997, 1998). Caldwell argues that CEQ’s institutional strength has varied over time as a function of multiple factors including funding, staffing, jurisdictional tension with EPA, and general understanding of CEQ and its role in federal environmental policy (Caldwell 1997, 1998 and Gibbons 2008). During the Nixon, Ford and Carter Administrations, CEQ was well-staffed, well-funded, and grew into a productive role in providing agency guidance on the EIS process, as well as issuing strong annual environmental quality reports. The Carter Administration’s, “*Year 2000 Report*,” produced in 1980, was a

pioneering document that forecasted current environmental trends twenty years into the future.

The Reagan administration hollowed out CEQ to the point of irrelevancy through de-funding and de-staffing from 49 employees to 8. These eight years of Presidential hostility to CEQ created a legacy of institutional weakness that CEQ still struggles to overcome. The subsequent administration of George H.W. Bush revived CEQ somewhat, particularly in the area of wetland conservation. He raised staffing levels from 8 to 31. The Clinton administration was largely hostile to CEQ and early in the first Presidential term attempted to abolish it. This effort was led by Vice President Al Gore and aimed to make EPA Director a cabinet level position. The proposed legislation – H.R. 3512 – ultimately failed, but revealed the Clinton administration’s lack of understanding or regard for CEQ’s institutional role and the role of NEPA generally. They cut CEQ staff from 31 to 25. The administration of George W. Bush was clearly distracted by foreign policy issues and military expansionism which left CEQ largely unwatched and unmanaged. CEQ staff were involved in the Bush administration campaign to control government communication on climate science. The Obama administration seems to have continued the trend of poor understanding of CEQ in the appointment of “Climate Czar” Carol Browner. Institutionally speaking, it is logical to delegate these responsibilities to the CEQ chairperson or, at a minimum, locate this new position within CEQ. By creating this position separate from CEQ, climate and national ecological health are administratively decoupled. This disconnect is not helpful for producing good science or policy.

The later writings of Lynton Caldwell express his frustration with the degree to which CEQ has been subjected to the political whims of the Executive (Caldwell 1997, 1998). It was clearly not the intention of NEPA's drafters to design CEQ in a manner that would allow this level of political interference in CEQ's charge. Specifically, Caldwell is most frustrated by the blurring of responsibilities between White House staff and the Executive Office of the President (EOP). Caldwell asserts that the EOP in its practiced form does not have a suitable level of political detachment as was its intent. Caldwell frequently cites the Brownlow Committee of 1939, which established the responsibilities of White House staff and the EOP as necessarily distinct. The Brownlow Committee intended for the EOP to be non-political, but rather managerial with policy and decision-making responsibilities. EOP leadership would be subject to Senate confirmation on the basis of their area expertise. Conversely, White House staff would serve as personal, political assistants to the President, have no policy-making authority, have limited issue-specific expertise, and would not be subject to senate confirmation.

Caldwell (1997) also discusses how the Presidency since 1960 and the election of John F. Kennedy has shifted from what he terms "The Institutional Presidency" to "The Personal Presidency" (Caldwell 1997, 45). He writes, "The personal presidency emphasizes political leadership and decision making by the man; the institutional presidency subordinates the man to the office and to the functions and duties specified under Article II of the Constitution" (Caldwell 1997, 45). He asks the valid question, "Does the power of a president reside primarily in the person or the office?" (Caldwell 1997, 45). This shift is clearly evident as related to CEQ. In the first decade of its existence, CEQ was respected on the basis of its congressional mandate and viewed as a

necessary institution responsible for the integration of a comprehensive national environmental policy. In later decades, it was subjugated, or altogether ignored, as a function of the Executive's political ideology and resulting policy priorities. CEQ has certainly not been immune to the pressures and developments in our larger political culture as substantive policy discussion has become increasingly overshadowed by political symbolism, discourse, and rhetoric (Fischer 2003).

Despite CEQ's history of Presidential interference, its most damaging attack came from Congress. Fundamental to Title II of NEPA is its environmental monitoring, reporting, and trend forecasting responsibilities. The opening to Title II's first paragraph declares these as over-arching priorities:

The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation (NEPA 1969).

Considered in the context of Etzioni's mixed-scanning model, this annual environmental quality report can be considered a fundamental policy decision. It is the central framework for the collection and interpretation of environmental information. As a continuous, long-term reporting requirement, it establishes ecological baseline data that can be used to evaluate improvement or decline in various areas of the environment. The

record can also be used for prospective analysis to identify trends. It provides NEPA's comprehensive, macro-orientation that makes NEPA a truly national policy.

In addition to the explicit features of Title II's annual reporting requirement, there also exists a critical implicit feature. This implicit feature is the report's function as a political buffer. This buffer – in the tradition of mixed scanning – incorporates the strengths of both rationalism and incrementalism. The report's reliance on scientific measurement and description gives both the document, specifically, and Title II, generally, its rationalist orientation and the benefits that accompany it. These benefits are a measure of political detachment and an expectation of scientific objectivity. A foundation in science gives the report authority and resists political distortion.

CEQ's annual report also offers the benefits of an incremental policy approach. The fact that the report is an annual ritual binds it somewhat to the expectations of past reports. This incremental character serves as a barrier to those Presidential administrations who would wish to weaken the report. A marked departure from the rigor and scope of analysis in past reports would likely generate negative attention from the media, interest groups, the public, and elected officials friendly to environmental concerns. In these respects, CEQ's annual reporting requirement incorporates the best elements of both policy models: the standard of bureaucratic convention as well as the evolving, assimilative capacity of science to expand and incorporate new knowledge. A truly balanced implementation of NEPA includes equal emphasis on both Title I and Title II of the statute. Such an implementation follows Etzioni's mixed-scanning model, incorporating micro-level project requirements, such as the court's established "hard

look” test regarding the EIS requirement, and macro-level monitoring for the nation, such as CEQ’s annual environmental report.

### **Federal Reports Elimination and Sunset Act of 1995**

The capacity of CEQ’s annual reporting requirement in giving direction to the broader NEPA statute suggests why opponents of environmental protection saw it as a nuisance — even a threat — and wished to eliminate it. If the nation is not monitoring its environmental decay on a comprehensive scale, then those individual project-level actions that are damaging cannot be connected to larger trends and, thus, seem isolated in effect. Opponents of national environmental accounting found their champion in the 104<sup>th</sup> or “Gingrich Congress” of 1995. The 104<sup>th</sup> Congress, emboldened by Republican gains in the 1994 mid-term elections, sought to implement their “Contract with America.” This document was aimed at reducing the size and scope of the federal government under the banner of fiscal responsibility. The plan was heavily grounded in conservative ideology and sought to further conservative priorities in areas such as national defense while “eliminating unjustifiable federal programs, such as subsidies to the arts and humanities as well as public television and radio” through budget cuts (Heritage Foundation, 1995). The broader Contract with America involved numerous legislative initiatives, one of which was the Federal Reports Elimination and Sunset Act (FRESA) of 1995.

Though the Contract with America claimed the objective of government transparency and accountability, the details of FRESA were decidedly murky. FRESA did not call for the immediate elimination of the targeted reports; rather, it set a sunset

date of December 21, 1999 at which all the reporting requirements listed in the bill would expire. The delay had the effect of masking the bill's severity, with the assumption that committees would have four years to save their pet reports. The four-year sunset clause also took advantage of the government's tendency to procrastinate. Further complicating FRESA interpretation was that no precise list of those reports set to expire was made available until the summer of 1999 by the Clerk of the House (House Report 106-458). This list was contained in an uncirculated committee report, House Document 103-7, from the previous Congress. The list itself was the source of confusion, errors, and inconsistencies. An effort to reinstate many of the affected environmental reports was presented in the proposed Resources Reports Restoration Act of the 106<sup>th</sup> Congress. The proposed Act described the problems with House Document 103-7 as follows:

First, the publication covered more than mere reports to Congress—it also addressed other submissions such as draft legislation, copies of environmental impact statements, budget documents, and copies of intergovernmental agreements. Few realized the wide-ranging impact of the termination of otherwise innocently termed “reports.” Second, the publication failed to list every report to Congress, creating confusion over which reports were affected. Third, it contained errors in report titles and statutory sources, creating great hurdles in identifying the underlying reports. Finally, it listed reporting requirements which had already been satisfied by the submission of the required materials to Congress and listed reporting requirements which had been repealed (House Report 106-458).

These features suggest that FRESA can be seen not as the good-faith effort to reduce the federal government's paperwork burden that it claimed to be, but rather a careless attempt to shrink government through a slash-and-burn approach to weakening its administrative capacity. The assessment above shows that there was little or no process of selection for

determining which reports had value and which didn't. The source for these determinations apparently had not even been fact-checked.

While conservative ideologues often claim incrementalism as their preferred model of policy change, FRESA signified a clear departure from an incremental approach. It was comprehensive in scope, but involved no component of rational analysis in deciding where the axe fell. FRESA was a political result of conservative movement goals: shrink government through any means possible irrespective of effect and public input. FRESA ultimately eliminated 150 federal reports submitted to Congress and available to the public (House Report 106-458). Such reports provide a record of government activity and opportunities for public involvement in determining their content. They reveal agency priorities and how policies are implemented by the bureaucracy. FRESA can, thus, be considered as ideologically antithetical to NEPA. While NEPA mandates an open process of analysis with numerous stages of public and stakeholder involvement, FRESA severely restricts the public's access to government information and activity without explanation.

### **Bounds to NEPA Rational Comprehensive Policy Intent**

The discussion in both Chapters Two and Three presents NEPA after 40 years of implementation. Chapter Two reviewed major aspects of the Act's legal history. The defining feature of NEPA's legal history is its incremental, procedural interpretation. The NEPA process requires agencies to take a "hard look" at project impacts, but what constitutes a hard look varies by project and has been inconsistently adjudicated. The courts have struggled to adjudicate NEPA due to its general language and absence of

enforceable, positive law. Trends in federal rulings, such as *Spiller v. White*, may portend erosion of the EIS requirement in favor of less rigorous process.

This chapter reviewed administrative developments related to NEPA and CEQ in the context of planning and policy theory. Administratively, NEPA guidance and agency implementation has suffered since 1981 due to political interference. CEQ — the institution intended to implement NEPA — has been poorly funded and poorly understood (Caldwell 1997, 1998). Absent strong political leadership on NEPA principles, some agencies have not exhibited more than the legally-defensible, minimum commitment to NEPA principles. Some agencies lack a consistent framework for evaluating project impacts, a framework that could yield time and cost efficiencies. CEQ's national annual environmental quality reports were eliminated by the Gingrich Congress in 1995.

Etzioni's mixed-scanning model suggests that without CEQ's annual reports, NEPA is imbalanced toward incremental policy implementation with no long-term direction or regard for fundamental decisions. An incrementalist, case-by-case, project-by-project orientation does not achieve NEPA's goal for science-based, rational comprehensive environmental decision-making. NEPA's language clearly intends a comprehensive, holistic, and integrated approach to ecosystem management which must incorporate broad scales in a unifying, over-arching framework that encompasses the entire earth system.

This tension between NEPA's rational, technocratic formulation and its largely legalistic implementation defines its policy character. While the techno-rational model aims for the greatest good for the greatest number as a normative goal, the legal model

encourages participation that is driven from a singular or narrow set of interests (Stephenson 2000). This contrast certainly applies to NEPA and has challenged its implementation over forty years. NEPA's rational comprehensive policy origins were surely well-intended; however, its largely legalistic implementation has complicated the achievement of a rational orientation.

NEPA's rationalist aspirations exist within established, well-defined bounds. Legally, NEPA is bound by the vagaries of the "hard look" test. Administratively, NEPA is bound by 1) political interference with CEQ and 2) information. Simon's procedural rationality helps us delineate these two administrative bounds. Etzioni's model of mixed scanning further highlights a specific informational need: the need for broad-scale, fundamental environmental information usable for long-term planning. This component of NEPA information was eliminated by the Federal Reports Elimination and Sunset Act of 1995.

The hard look test is established legal precedent and can be considered a fixed variable. CEQ's 40 year history of political subversion, weakening, and misunderstanding suggest that political interference with NEPA's mandate is also a fixed variable. It may also be reasonable to expect that these negative political pressures may not just remain constant, but increase. The era of transformative environmental legislation has passed. The expanding legal requirements of the EIS process have made full-scale impact analysis costly and time-consuming. Growing entitlement spending, partisan gridlock, and the cost of maintaining extensive overseas military commitments suggest that federal spending on the environment will be less in the future. Thus, information is the most fluid variable of the three.

Given these real and consequential bounds to the achievement of NEPA's rationalist legislative intent, it is appropriate to ask, "how can NEPA, generally, and CEQ, specifically, be strengthened given the constraints which forty years of incremental implementation have produced?" This answer is information. NEPA has and always should have a reliance on quality, interdisciplinary science-based information as its main policy strength. This information must also be accessible. No, NEPA does not prescribe a specific outcome, but it does inform. This variable of information is not fixed and it certainly can be strengthened. Such strengthening may produce a new, long-term national commitment to NEPA principles. The means for this transformation is the renewal of a comprehensive focus within CEQ. NEPA's conceptual and practical foundation – information – might eventually be used not only to uphold NEPA principles against legal erosion and political interference, but also to improve both legal and administrative decision-making.

The next chapter evaluates a broader effort to promote comprehensiveness in environmental information: the effort to develop national environmental indicators. This effort overlaps with NEPA's comprehensive mandate, but has also moved forward on its own for over a decade. Analysis of efforts to develop comprehensive national indicators informs both an understanding of what is reasonably achievable considering NEPA's constraints as well as potential areas of unmet need or niches which CEQ might fill.

## Chapter 4: National Ecological Indicators and the Call for Comprehensiveness

The discussion above presents NEPA in the context of legal, administrative, and informational bounds relative to its rational comprehensive intent. These bounds prevent the achievement of a truly national environmental policy. Relating these bounds to both Simon's concept of procedural rationality and Etzioni's mixed-scanning model suggests that NEPA must maintain its macro-level orientation as outlined in Title II of the statute. This fundamental, broad-scale, and long-term focus has been undermined by political interference with CEQ's mandate, including the elimination of its annual reporting requirement in 1995.

While the vulnerability of NEPA's macro-orientation has been proven, its importance persists. A clear balance between micro-level policy steps, as typified by project-level impact analysis, and macro-level policy guidance, as typified by a national environmental reporting requirement, is key to NEPA's strength and relevance. Both can be considered NEPA's operative elements. The structure of the Act is suggestive of this balance between micro- and macro-oversight with its division into Title I and Title II sections. While neither Caldwell nor other NEPA drafters have commented on any explicit linkages between mixed-scanning and NEPA's policy formulation, clear parallels exist. These parallels weigh short-term, sometimes politically-influenced project proposals against fundamental priorities of national importance.

The capacity of a mixed-scanning approach to provide balance between the political and the rational is its strength. It simultaneously accommodates and moderates both influences. Etzioni describes mixed scanning as "a useful strategy for decision-

making in environments of varying stability and by actors with varying control and consensus-building capacities” (Etzioni 1967, 385). Chapters Two and Three established that national environmental policy is itself an area of “varying stability,” subject to intrusion, interference, and misinterpretation by all three branches of government. Even during the drafting of NEPA, Caldwell reports that he and his fellow authors had “no naïve illusions as to the readiness of the agencies to comply with the intent of the Act” or “willingness of the Executive to enforce compliance with the Act” (Caldwell 1973, 167). Their precaution against government antipathy was significant public involvement and reporting requirements. As discussed, some of these requirements have been eroded as the NEPA process has shifted from EIS to EA review. This decrease in public participation leaves NEPA out of balance between the political and rational.

The integration of mixed-scanning theory and the historical analysis presented above makes clear that NEPA’s comprehensive, macro-level information focus must be renewed if the Act is to maintain continued relevance in the future. While the first half of this thesis focused on NEPA’s constraints and offered mostly critique, the second half of this thesis explores opportunities to strengthen and integrate NEPA in the context of its macro-level information mandate. A format for resumption of NEPA’s macro-level functions will be proposed in the form of a comprehensive information product that integrates two components: 1) a national land use and ecosystem inventory with 2) ecological foot-printing. The following section demonstrates the need for comprehensive, macro-level ecological information.

Almost immediately upon elimination of CEQ's annual reporting requirement in 1995, a din began rising within bureaucratic, environmental science, and policy circles. This din was in the form of an organized, growing call for a national system of ecological indicators. Though such a system had also been discussed in the 1970s and 80s, a review of these efforts reveals the most progress toward this goal took place during the late 1990s and early 2000s. Although the elimination of CEQ's report was certainly a defeat for environmental advocates, it initiated this clarion call for formalized comprehensive environmental information and reporting. Appendix B provides a chronology of the seminal reports in this effort.

The reports themselves have a progressive character, each referencing content from previous reports. In other instances, different reports commissioned by different federal bureaucracies produce almost entirely the same results. A brief summary of the key themes developed in this series of reports is, thus, necessary and instructive in understanding both the need for and essential features of an integrated national ecological information system.

## **Scientific and Technical Focus (1997-2003)**

### **National Science and Technology Council**

The first report in this body, "Integrating the Nation's Environmental Monitoring and Research Programs: A Proposed Framework," was commissioned by the White House Office of Science and Technology Policy (OSTP) in 1995 and undertaken by the National Science and Technology Council (NSTC). The NSTC is a cabinet-level council charged with coordinating federal research and development activities. The report,

released in March, 1997, initiated discussion of both objectives and methods for integrating environmental data. The NSTC report outlined three objectives to be pursued:

1. **Status of ecosystems.** Document coincident status and trends of multiple resources and related environmental and socioeconomic conditions.
2. **Causes and consequences of change.** Using the best scientific information available:
  - Relate status and trends to human and natural causes and consequences,
  - Predict future trajectories and rates of change,
  - Assess uncertainties, and
  - Identify data, information, and research needed to reduce future uncertainties.
3. **Options and outcomes.** Evaluate science-based approaches for ensuring sustained productivity, vitality, use, and enjoyment of ecological systems (NSTC 1997, viii).

These three objectives are clearly consistent with NEPA principles. Objectives one and two relate very closely to language in Title II which mandates monitoring of the national environment's "status and condition" along with its "current and foreseeable trends" (NEPA 1969). Objective three closely follows NEPA's overall regard for "productive and enjoyable harmony between man and his environment" (NEPA 1969). Although NSTC's objectives were proposed in a general context outside of NEPA or other specific environmental legislation, the objectives are proof that in some sense NEPA principles have been adopted – at least as an ideal to be pursued – by the federal bureaucracy. The objectives acknowledge that humans are intertwined with both environmental and economic systems. The objectives promote a science-based understanding of the environment that explores causal relationships and can increase predictive capacity.

The NSTC framework proposed the integration of environmental data along three scales. The first scale, “Inventories and Remote Sensing Programs,” would apply to large regions and would be collected using remote sensing technology. This technology uses satellite and aerial imagery to record and characterize land classes and uses. These technologies did not exist for environmental science applications at the time of NEPA’s drafting or during the first decades of its implementation. Remote sensing technology provides a powerful site characterization capability, and some new formats, such as Google Earth, are free and available to the public. Although some software may not include the sophisticated analytical packages used by researchers, it has certainly democratized public use of landscape imagery. The influence and analytical capabilities of this technology should be expected to grow for both research and public use purposes (NSTC 1997).

The second scale, “National and Regional Resource Surveys,” is intended to evaluate certain physical properties of a region by sampling a subset of the total area, as opposed to the entire area. These monitoring efforts would target specific environmental concerns or a relatively small set of variables needed by resource managers. These variables may have national or regional coverage depending on their relevance to management priorities. Integration of scale 1 and 2 data can help provide “ground truth” calibration of remotely sensed data. Scale 2 information quantifies conditions and changes in specific ecosystem types. It is not the main priority of scale 2 monitoring, however, to investigate the cause or detailed features of a specific change. Explaining causal relationships is the focus of scale 3 monitoring: intensive monitoring and research or “index” sites. Index sites monitor greater numbers of variables at higher frequency

than scales 1 and 2. The central focus of scale 3 monitoring is explaining causal linkages and testing predictive models of environmental response. The activities of the Long Term Ecological Research (LTER) Network are representative of scale 3 monitoring. Index sites can be fewer in number than scale 1 and 2 monitoring areas, but must be sited to achieve representation of all ecosystem types.

Collectively, these three scales provide a useful general model for data collection and integration. They advocate use of best available technology for ecosystem assessment and delineation. Most importantly, they recognize the importance of scaleable results in ecological research and begin the discussion of appropriate scale of measurement.

## **Heinz Center**

The comprehensive discussion continued in late 1997 under the leadership of the H. John Heinz III Center for Science, Economics and the Environment (Heinz Center), which was commissioned for this effort by the White House Office of Science and Technology Policy. The Heinz Center has published a series of reports on comprehensive ecological information, the first two of which can be discussed as one body. “Designing a Report on the State of the Nation’s Ecosystems” (1999) provided explanation and justification for the format of their second report, “The State of the Nation’s Ecosystems: Measuring the Land, Waters, and Living Resources of the United States” (2002).

The Heinz reports contain some of the same themes as the NSTC report. They once again stress the need for comprehensiveness, citing the importance of economic

indicators such as Gross Domestic Product; interest, unemployment, and inflation rates; and market indices such as the Dow Jones Industrial Average in managing the national economy. Management of the national environment similarly requires its own set of broad indicators (Heinz, 2002). The “State of Nation’s Ecosystems” report uses 10 core indicators arranged among 4 categories. These categories are: 1) “System Dimensions, 2) Chemical and Physical Conditions, 3) Biological Components, 4) Human Use.”

While the NSTC report focused more on broad goals and appropriate scales of investigation, the Heinz report takes what may be considered a next logical step by proposing specific measurements of ecosystem condition. Categories 2 and 3 contain most of the new proposals. Category 2, “Chemical and Physical Conditions,” consists of two indicators: 1) “Movement of Nitrogen” and 2) “Chemical Contamination.” “Movement of Nitrogen” monitors both surface runoff non-point source pollution and groundwater nitrate contamination. Non-point source pollution and its resulting hypoxic zone in the northern Gulf of Mexico have proved to be widespread, intractable problems. Their persistence suggests that traditional regulatory approaches such as the Clean Water Act are unsuited for diffuse, regional problems. Such problems require a comprehensive management approach. The Clean Water Act has certainly achieved other successes in multiple areas such as municipal wastewater treatment and industrial pollution control. This second component of Category 2, chemical contamination, includes point-source pollution covered by the Clean Water Act, non-point sources from agricultural runoff excluding nutrients, urban stormwater runoff, as well as a broad class of “emerging contaminants” such as hormones, pharmaceuticals, and antibiotics.

Category 3, “Biological Components”, contains three core indicators. The first, “At-Risk Endangered Species,” encompasses plant and animal species in various stages of population decline, such as those listed under the Endangered Species Act (ESA). The second indicator, “Condition of Plant and Animal Community,” measures habitat modification in ecosystems. The third and final core biological indicator is “Plant Growth Index,” elsewhere referred to as net primary productivity. This metric can be used to indicate changes in plant growth rates and species composition due to weather, climate, plant species succession, or habitat modification.

Category 1 of the Heinz report, “System Dimensions,” does exhibit overlap with the NSTC framework for integration. The NSTC framework proposes “Status of Ecosystems” as its very first indicator. The framework suggests this objective be met through the increased use of remote sensing technology, coordinated with monitoring networks and highly-controlled index sites. The Heinz, “State of the Nation’s Ecosystems, report describes “the area of an ecosystem [as] its most basic characteristic” (Heinz 2002, 2). The proposed indicator should utilize the USGS Multiple Land Resolution Characterization (MRLC) Program and Earth Resources Observation System (EROS) as its data source. Similarly, the NSTC report also cites the MRLC and EROS programs as best able to meet a “clear need for developing comprehensive and consistent land-cover and land-characteristics information for the United States” (NSTC, 1997). These congruities support an assertion that remotely-sensed national land use and ecosystem classification monitoring is the most fundamental of programs in any larger initiative of national ecological monitoring.

The fourth category of indicators in the Heinz report, “Human Uses, also overlaps with the NSTC proposed framework for integration. The NSTC framework proposes to “relate status and trends to human and natural causes and consequences” as part of its second objective, “Causes and Consequences of Change” (NSTC 1997, viii). The Heinz report, however, takes a decidedly different tack on the issue of human-induced ecological change and argues against such correlations:

The Report will focus on the state of the Nation’s ecosystems, rather than environmental pressures that might change that state, or on the actions of government, private individuals, or businesses that might seek to affect that state. While information on pressures and responses clearly has its uses, the interpretation of such data presents additional challenges to the scientific credibility and political legitimacy of a reporting effort. The Design Committee therefore decided to limit the Report to the single, crucial task of characterizing the status of the Nation’s ecosystems. The Committee is confident that there is no shortage of groups both within and outside government that would use a credible, unbiased Report on the State of the Nation’s Ecosystems in their own efforts to interpret, change, or design policy. (Heinz 1999, xii)

Thus, a notable addition to the Heinz reports is the inclusion of political concerns. While the 1997 NSTC report only mentioned the word “political” one time in a 102-page document, the Heinz reports confront the issue of politics in several instances and argue for a measure of scientific detachment consistent with NEPA principles. In this respect, their report advocates a rational comprehensive focus. An indicator system should provide the data needed to propose and evaluate policy choices, but should remain separate from evaluation itself and any eventual decision-making. The use of indicator data for program development should be performed by personnel, institutions, and funding streams separate from monitoring. This acknowledgement of political concern

may be interpreted as a more pragmatic assessment of the barriers to actually passing a national ecological indicator system into public law. These concerns may also reflect changes in the larger political environment which have made federal environmental policy decisions controversial and subject to local revolt (Doremus and Tarlock 2008).

### **National Research Council**

During development and publication of the Heinz reports, the National Research Council of the National Academy of Sciences (NRC) was simultaneously commissioned by EPA to produce its own report titled, “Ecological Indicators for the Nation”, published in 2000. Both the timing and substance of the NRC and Heinz reports are close to identical. The NRC report proposes eleven core indicators among three indicator categories. Their proposals are as follows:

- As indicators of the extent and status of the nation’s ecosystems, the committee recommends *land cover and land use*.
- As indicators of the nation’s ecological capital, the committee recommends *total species diversity, native species diversity, nutrient runoff, and soil organic matter*.
- As indicators of ecological functioning or performance, the committee recommends *carbon storage, production capacity, net primary production, lake trophic status, stream oxygen*, and for agricultural ecosystems, *nutrient-use efficiency and nutrient balance* (NRC 2000).

The NRC committee’s first indicator bears considerable similarity to the NSTC’s “Status of Ecosystems” objective and Heinz reports’ “System Dimensions” indicator. In all three instances, ecosystem extent and status are listed as the proposal’s first and most important informational requirement. The NRC’s second and third indicators, “Ecological Capital” and “Ecological Functioning,” closely parallel the Heinz Center’s second and third

indicators, “chemical and physical conditions” and “biological components.” Both sets emphasize measures of species abundance, species interactions, nutrient fluxes, and biogeochemical cycling.

Though the NRC and Heinz reports are surely not the first time the federal government has duplicated its own efforts, this duplication is instructive in several respects. First, the duplication is demonstrative of a clear need for comprehensive, integrated environmental reporting. Second, the similarities between each of the two proposals suggest that a functional ecological monitoring framework is closer to, rather than further from, scientific consensus. Once scientific agreement has taken place, only political will remains. Third, the duplication hints at a degree of institutional territorialism. The Heinz report was commissioned by the White House Office of Science and Technology Policy which, like CEQ, is within the Executive Office of the President. Given the institutional proximity of OSTP to CEQ, it is at least reasonable to consider the possibility that federal production of this report would eventually be coordinated within the EOP, possibly by CEQ, either through legislation or Executive Order. The National Research Council report, however, was commissioned by a specific agency within the Executive – EPA – which may have aspirations toward a larger or even unitary role in ecosystem management. Since the elimination of CEQ’s annual report, an administrative void exists which, if eventually filled, will be a source of additional funding and responsibilities. Federal agencies certainly tend to seek more power and authority as it may become available rather than less. EPA’s subsequent actions follow this pattern.

## **Environmental Protection Agency (EPA)**

EPA's desire to play an expanded role in development and oversight of national ecological monitoring and reporting was made clear with the publication of its 2003 "Draft Report on the Environment Technical Document" (DROE). Although this was only an initial attempt as the title suggests, its presence laid EPA's claim to a role in comprehensive environmental reporting. The 457-page document lives up to its title as a "Technical Document," contains thorough discussions of complex scientific issues, and reads as if the target audience were presumed to be environmental scientists with doctoral degrees. Its usability by lay policy-makers and generalist legislative staffers is questionable. Its contents and conclusions require a fair amount of interpretation, making the document somewhat inaccessible to a broad policy audience.

Air quality, water quality, toxic chemicals, and their intersection with human health comprise much of the report, consistent with EPA's legislative charge. Of the five "theme areas" in the DROE – "Clear Air, Purer Water, Better Protected Land, Human Health" – the last, titled "Ecological Condition", strictly focuses on ecosystems as the primary unit of analysis. The DROE acknowledges in the first page of the ecological conditions section that its indicator choices were heavily influenced by the 2002 Heinz Center report. Following a dominant theme from not only the Heinz Center, but also the NSTC and NRC reports, the DROE lists "ecosystem extent" as the primary indicator parameter for the first five of its six proposed ecosystem classes. These classes are: 1) forests, 2) farmlands, 3) grasslands/shrublands, 4) urban/suburban land, 5) freshwaters, and 6) coasts/oceans. The DROE proposes a seventh category of indicators which would apply to the "Entire Nation" and all ecosystem types. The six proposed indicators are:

“ecosystem extent, at-risk native species, bird community index, terrestrial plant growth index, movement of nitrogen, and chemical contamination.” As with the Heinz and NRC proposals, these physical indicators reflect broad metrics of chemical cycling in the environment as well as plant & animal population biology. And, again, “ecosystem extent” is listed first, implying its primacy in a larger system of metrics.

## **Institutional and Political Focus (2004-2007)**

### **Government Accountability Office**

Despite EPA’s initial entry into comprehensive ecological reporting, the federal government still perceived both the substance and institutional home for coordination of national ecological information to be undecided as of 2004. In this year, the General Accounting Office (GAO) published, “Environmental Indicators: Better Coordination is Needed to Develop Environmental Indicator Sets that Inform Decisions.” The report can best be described as 1) a survey of important monitoring efforts at state, regional, and federal scales, and 2) a discussion of the institutional challenges to development and administration of a coordinated system. Both the Heinz Center “Status of Ecosystems” (2002) report and EPA “Draft Report on the Environment” are referenced in detail. The GAO report does not discuss the merits of specific physical indicators. Rather, it addresses the process and bureaucratic issues involved in the adoption of an indicator system. In this respect, it can be seen as marking the start of a new focus on the path toward national ecological indicators. This focus accepts that the technical and scientific aspects of indicator development are well underway — as evidenced by the NSTC, NRC,

Heinz Center, and EPA reports — and that the next visible challenges on the horizon are of a political and administrative nature.

As its title suggests, the core theme of the GAO report is that administrative coordination has not been achieved. It does not, however, make strong recommendations for where leadership of this effort should be centered. Although an explicit statement is not made, the report seems to imply a slightly rising role for EPA and slightly waning role for CEQ. The report credits CEQ with contributions made since 2002 by its Interagency Working Group on Indicator Coordination as “promising, but they lack the long-term, stable institutional arrangements needed to ensure continued guidance and coordination of federal activity in this area” (GAO 2004). The GAO offers only marginally more praise for EPA’s success at comprehensive monitoring:

The previous EPA efforts have been hindered not only by technical difficulties in establishing linkages between program activities and changes in the environment, but also by changes in leadership within the agency and the lack of needed resources for monitoring environmental conditions. Monitoring activities have had trouble in competing for limited resources with EPA’s regulatory programs and activities. Recently, the Administrator of EPA has endorsed the continuation of the agency’s indicators initiative in principle, and EPA has included the initiative as a performance measure in its annual performance plan for data quality activities. (GAO 2004, 7)

Though the above passage may not qualify as a strong endorsement of EPA’s past approach to coordination, it is important in two respects. First, it cites the need for leadership and resources in achieving comprehensive environmental monitoring. The implication is that if EPA simply had the resources, it would be a logical institution to lead the coordination effort. Second, it does give credit to the initial, tentative steps the

EPA Administrator has taken with its indicators initiative. This statement suggests that where there is the political will, there is a way. These first steps occurred from 2001-2003 under the leadership of Christine Todd Whitman, former Republican Governor of New Jersey. The forward progress on comprehensive monitoring during this period is somewhat surprising, given the low relative status of environmental issues in the larger sphere of Bush administration policy priorities. These efforts may be cynically interpreted as chasing a mirage, an exercise in pursuing a goal that has not been actualized despite years of attempts and some may not view as achievable. Alternatively, these efforts – occurring even in an unsupportive political environment – suggest a permanence to this unfulfilled need.

Additional comments in the GAO report elaborate on the relationship between political climate and indicator development. The GAO argues for a science-based, collaborative process of indicator development that is at the same time inclusive and expert-driven. In these respects, their preferred development approach is consistent with both rational comprehensive planning and NEPA principles as practiced in Section 102(2)(c). The authors also acknowledge the challenge that this process-centered approach presents:

Developers reported that support for an indicator set can be undermined if it is viewed as biased because of its association with a particular political perspective or leader. The process of developing an indicator set can be an intensely political process that challenges both the credibility and relevance of a set. Developers of the sets we reviewed largely relied on collaborative processes to define the purpose and intended use of the indicator set, determine the conceptual model and criteria for select indicators, and selecting the indicators themselves. Such processes are difficult to manage to ensure a set's credibility and relevance (GAO 2004, 23).

It is difficult to interpret whether such a statement supports or undermines consideration of CEQ as institutional home for indicator development. As Chapter Three established, CEQ has been largely unable to detach itself from the political priorities of the President since the Reagan administration. Caldwell cites the blurring of responsibilities between the EOP and White House Staff as the cause of CEQ's political turmoil (Caldwell, 1997). In the most recent administration of George W. Bush, CEQ was used as a tool to refute and wage an information campaign against accepted climate science.

### **CEQ Interagency Working Group**

Nevertheless, during this same period CEQ was moving forward in fulfillment of its own comprehensive mandate, undeterred by EPA's entry into what some might have still considered to be CEQ's turf. CEQ's actions over the next several years sought to restore this mandate after having been diminished by FRESA and the elimination of its annual environmental quality report. In a memo distributed on December 31, 2002, then CEQ Chairman, James Connaughton, created the "Interagency Working Group on Indicator Coordination" (Working Group) composed of representatives from the Departments of Agriculture, Commerce, Defense, Health and Human Services, the Interior, and Transportation, as well as EPA and the White House Offices of the Federal Environmental Executive, Management and Budget, and Science and Technology Policy (GAO 2004). The Working Group's first meeting was convened in March, 2003, "to consider ways to enhance the nation's capacity to regularly report on natural and environmental resources, as well as related health, social, and economic factors, using a comprehensive set of indicators" (GAO 2004, 34). This effort was to be conducted in

furtherance of NEPA's requirement that CEQ "document and define changes and trends in the natural environment, and accumulate the necessary data and other information for a continuing analysis of such changes and trends and an interpretation of their underlying causes" (GAO 2004, 34).

From 2003 to 2006, the Working Group developed an "approach and policy framework" that sought to define both the process of indicator development and provide it with a strong theoretical foundation (GAO 2004, 34). An "Integration and Synthesis" subgroup was also convened to evaluate key federal and non-federal efforts in the context of a systems approach. A systems approach emphasizes linkages and relationships as a primary unit of analysis. This work eventually produced a general conceptual framework to guide indicator selection, application, and incorporation of data and information technology resources. This period from 2003 to 2006 can be viewed as the Working Group's technical and process-centered focus.

### **National Academy of Public Administrators**

In 2006, CEQ and the U.S. Department of Interior (DOI) commissioned the National Academy of Public Administration (NAPA) "for assistance in assessing institutional options for developing and reporting national environmental indicators" (NAPA 2007, 1). Commissioning of this report marked a shift in focus of the Working Group from technical to institutional. The eventual product from NAPA was the 2007 report, "Green Compass: Institutional Options for Developing a National System of Environmental Indicators". The report is structured around a "mantra" of "think big, start small, and ramp up fast" (NAPA 2007, 10). It proposes the eventual adoption of cross-

cutting, “headline indicators” that will “serve as a focal point of public discussion” (NAPA 2007, x). Despite their comprehensive nature, NAPA also proposed that these indicators be implemented in incremental fashion in the form of a pilot program addressing water quantity issues. The pilot program should generate interest among and demonstrate value to state and local governments. This seeming contradiction between a comprehensive focus and an incremental implementation is not well explained in *Green Compass*. The proposed strategy seems very tentative, possibly premature. The implied risk is that if the pilot program does not go well, then the larger effort is jeopardized. While this approach may offer pragmatism in considering the sizable challenge of national indicator creation and the resources it may be expected to require, the questions of how programmatic pieces will be added and integrated later to achieve a synthesized, comprehensive whole is left unanswered. The report’s “Ramp up Fast” recommendation simply argues that with enough momentum, the larger goals can be achieved. In a general sense, *Green Compass* does not seem to have the breadth and depth of prior reports, especially with regard to the scientific and technical challenges of integration. This is understandable given NAPA’s mission and areas of expertise, but this bias causes the report to seem insufficient by the standard of previous reports.

The one area in which this report does excel, however, is evaluating the merits and drawbacks of various institutional homes for this effort. Their recommendation very honestly and openly acknowledges the political considerations of each choice. This builds on political themes raised in both the Heinz Center and GAO reports. The NAPA assessments deserve to be quoted in full despite their length:

### **Where to Anchor the Leadership Body**

Four options have been identified for anchoring the Leadership Council or other primary entity: the U.S. Office of Management and Budget (OMB), Council on Environmental Quality (CEQ), Office of Science and Technology Policy (OSTP) or another federal agency. As the white paper discusses, the central challenge is vesting the entity with sufficient clout to ensure effective coordination by multiple agencies while providing checks and balances to protect against the reality or appearance of political manipulation.

- The advantage of making OMB the locus for anchoring the indicator system is its unmatched clout. The disadvantage is the perception of some federal agencies and some states that OMB's primary focus is on cutting federal spending and reducing the information collection burden.
- The role initially envisioned for CEQ by the National Environmental Policy Act seems to make it a logical locus. However, CEQ has not fulfilled that vision in any Administration and its historic role as the President's policy advisor carries strong political associations that would require insulation or checks and balances to protect the indicator system's credibility. In addition, the political priorities of CEQ's leadership on behalf of the President, especially at the beginning of a new Administration, might work to eclipse attention to the design of an environmental indicator system.
- Although time did not permit its full consideration, OSTP might deserve further consideration. For example, its Committee on Environment and Natural Resources has experience in coordinating interagency efforts. However, OSTP lacks the political imperative of CEQ and its mission is focused primarily on science and technology (NAPA 2007, 9).

The negative assessment on the appropriateness of CEQ to lead this effort echoes themes from the historical analysis presented in Chapter Three. As that chapter recounted, CEQ has had a rocky history and received, at best, mixed support from Congress and the Executive. The Clinton administration implied that CEQ was institutionally redundant when it supported H.R.3512, which proposed to "abolish" CEQ and elevate EPA to cabinet status. Such history does suggest there is some political risk in locating a new initiative within CEQ. Lindblom's procedural rationality acknowledges that program administration is subject to the constraints of that institution tasked with implementing it.

There is a measure of doubt as to CEQ's capacity for strong guidance and leadership on program implementation. The history of political interference with CEQ suggests that future programs may be heavily influenced by Presidential priorities to their benefit or detriment.

## **Current Status and Conclusions**

At present, the only published product of CEQ's work toward national indicator development is a "National Environmental Status and Trends Indicators" (NEST) internet website using water as a case example. Across the top of the website are the words "DRAFT WEBSITE" in large, bold script. Near the title area, the website states "This website has not been officially launched, is under development, and is subject to change" (<http://www.fs.fed.us/NEST/index.shtml>). The website has not added content nor expanded in scope beyond the pilot area of water since mid-2009. At the very bottom of the page, the following is written: "Last modified: Friday, 22-May-2009 17:48:06 EDT." Thus, it appears the effort has been temporarily halted, if not eliminated.

There is no mention of or link to the NEST website on CEQ's official government website as of March 17, 2010 (<http://www.whitehouse.gov/administration/eop/ceq>). In fact, the current CEQ website contains no references to NEPA's comprehensive mandate. Under the page's "initiatives" tab, the only mention of NEPA is in one of out seven current initiatives. This initiative is titled, "Steps to Modernize and Reinvigorate NEPA." It contains four proposals: 1) when and how Federal agencies must consider greenhouse gas emissions and climate change in their proposed actions; 2) clarifying appropriateness of "Findings of No Significant Impact" and specifying when there is a need to monitor

environmental mitigation commitments; 3) clarifying use of categorical exclusions; and 4) enhanced public tools for reporting on NEPA activities (CEQ, 2010). These priorities relate exclusively to Section 102(2)(c) requirements. Thus, the Obama administration has effectively abandoned national indicator development, the contributions of the Bush Administration CEQ toward that goal, and a comprehensive Title II mandate. These developments support the argument that CEQ offers little in the way of program continuity beyond agency guidance toward satisfying the legal requirements of Section 102(2)(c).

Publication of EPA's 2008 "Report on the Environment," formalized EPA's ongoing intent to maintain an institutional presence in comprehensive environmental reporting. EPA may be considered as competing with CEQ for similar resources despite CEQ's much smaller funding and staffing levels. The report is very similar in format to its 2003 predecessor, "Draft Report on the Environment Technical Document." Thus, it appears that, at present, EPA is winning the battle for leadership on comprehensive ecological monitoring and reporting. The degree to which EPA will devote the necessary resources to this effort remains to be seen, especially given their new responsibilities in regulating greenhouse gas emissions.

The reports analyzed above demonstrate a need for comprehensiveness in environmental information. The first body of reports – the NSTC, NRC, Heinz, and EPA DROE reports – address primarily scientific, technical, and methodological challenges in the creation of a national ecological indicator system. The reports display considerable overlap on core indicator proposals, suggesting scientific consensus is closer to rather

than further from achievement. All reports propose a national land use and ecosystem extent inventory as their primary metric.

The second set of reports — consisting primarily of the GAO and NAPA reports, but also some content in the Heinz reports — treat the challenge of achieving political, institutional, and procedural consensus. This is admittedly more difficult. They raise the issue of what institution should lead a national ecological indicator system. CEQ does not receive a favorable assessment. At times, it appears CEQ and EPA are cooperators, but in other instances they appear to be competitors, simultaneously but separately working toward the same goal.

The above histories raise the possibility that even modest achievement of CEQ's comprehensive mandate may be a distant prospect. While the contributions of this decade-long effort to prompt the development of national ecological indicators still appear in a figurative rear-view mirror, it is appropriate to imagine — if only as a thought exercise — what a comprehensive product put out by CEQ might look like. This product must be reasonable in scope, low cost, and relate to possible future establishment of a national ecological indicator system.

## Chapter 5: A Proposal for National Impact Analysis

Chapter Four established three important themes. First, a series of reports and initiatives proposing national ecological indicators demonstrates a national need for comprehensive ecological information and assessment. Second, the most fundamental feature of these reports was the proposal of a national land use and ecosystem inventory. Third, CEQ may not be the clear institutional home for comprehensive ecological monitoring. At best, CEQ has received mixed political support over the last three decades and now faces competition with EPA for authority and resources to maintain a comprehensive environmental charge.

Nonetheless, when viewed together these three factors may still suggest a path forward for CEQ. Although its formal annual environmental report to the President and the Congress was eliminated with FRESA, CEQ still has a mandate that relates to Title II of NEPA.

Until 2000, the White House Council on Environmental Quality (CEQ) was required to transmit an annual environmental quality report to Congress. Although the annual reporting requirement is no longer in effect, CEQ is still required to accumulate the necessary data and other information needed for a continuing analysis of changes and trends in the natural environment and an interpretation of their underlying causes. Whereas scientists, agency officials, and academicians generally agree on the need for periodic reporting of conditions and trends of environmental and natural resources, no consensus has been reached on who should be responsible for this task or how it would be best achieved (GAO 2004, 18)

The fact that this mandate was pursued by CEQ during the Bush administration – an administration that otherwise might be remembered as reluctantly or non-supportive of environmental values – suggests that CEQ will pursue its comprehensive mandate until it

is either eliminated or EPA is solely charged with these responsibilities. The above passage also supports an assertion that it is yet undetermined who will lead in the area of comprehensive environmental information.

### **A Possible CEQ Comprehensive Product and Its Features**

To maintain its Title II relevance, CEQ's path forward must involve several features. First, CEQ must differentiate itself from the focus EPA has taken with respect to comprehensive ecological reporting and monitoring. It must acknowledge that EPA has considerably more staffing, funds, and public name recognition. Thus, it is imperative that CEQ put out a product that is separate and distinct from one expected to be pursued by EPA such as its 2008 Report on the Environment. As discussed in Chapter 3, EPA's approach to ecological indicators is but one effort in five that also aim to address water, air, human health, and toxic pollution. Furthermore, the EPA 2003 Draft Report on the Environment and 2008 Report on the Environment are highly technical documents that require significant knowledge of environmental science and chemistry to be understood. The metrics and concepts presented in each are not easily communicable to laymen.

Thus, any comprehensive product from CEQ must be accessible as a primary goal. It must inform the public as well as experts. It must strive not only for scientific understanding of environment impacts, but social, economic, and historical impacts as well. A comprehensive product from CEQ must also focus specifically on human-environmental interaction and evaluate this balance as its primary unit of analysis. The selection of a unit of analysis that frames environmental impact in clear human terms

buttresses this product's companion goal of accessibility. Parts per billion, micrograms per liter, or a sigmoid-shaped model of species population decline read as distant numbers on a paper to those without subject-specific environmental science training. When this language becomes *de rigeur*, it limits the extent to which environmental values and knowledge can be shared by a broad cross-section of American society.

In other words, CEQ's contribution to comprehensiveness in ecological information must stay true to NEPA principles of interdisciplinarity, public accessibility, impact analysis, and regard for the future. Environmental science has progressed far in the 40 years since NEPA's passage. NEPA deserves credit for helping to initiate this growth in environmental science. What has not been achieved over the past 40 years, however, is updating the operative features of NEPA to utilize the latest methods in environmental science and assessment.

### **Integration of Ecological Footprint Analysis**

At its core, NEPA is concerned with human impacts on the environment. While NEPA surely has curbed the impacts of various agency actions, its overall thrust is not rigid adherence to the minimization of impacts, but rather, an informed understanding of them. The most well-defined and well-practiced example is Section 102(2)(c). This Section operates under the assumption that when impacts are understood, agencies, business interests, and the public will hopefully anticipate, plan for, and modify their actions in ways that consider environmental impacts ahead of project development. Just as NEPA provides guidance to agencies on impact analysis, it is also capable of providing guidance to the nation on ecological impacts. This guiding role is the essence

of Title II and the remaining charge of CEQ as evidenced by the GAO quote above.

Thus, one of the most valuable contributions NEPA has made and must continue to make into the future is as a framework for understanding.

Ecological Footprint analysis is a prominent and accessible method for quantifying individual ecological impact. An ecological footprint is that area of land required to support a human being at a given level of affluence. A footprint most directly represents how humans impact the land (Merkel 2003). The area represents the flows of nature needed to sustain human life and absorb its waste. A precise definition of an ecological footprint has been offered by the World Wildlife Fund (WWF) as “the area of biologically productive land and water needed to provide ecological resources and services – food, fibre, and timber, land on which to build, and land to absorb carbon dioxide (CO<sub>2</sub>) released by burning fossil fuels” (WWF 2008, 14).

Ecological Footprinting (EF) addresses biophysical limits to resource use. Unlike other methodologies of environmental accounting, EF places humanity as a subsystem within a larger global ecosystem. This arrangement acknowledges that humans are dependent on the natural environment not only as the source of wealth creation, but survival. Dominant economic models integrating environmental considerations view the natural environment as something external to human society and market structures (Daly 2004). EF acknowledges human dependence on environmental services and flows much more directly and, many may argue, accurately. Services provided by healthy intact ecosystems include:

- supporting services such as nutrient cycling, soil formation and primary production
- provisioning services such as the production of food, freshwater, materials or fuel

- regulating services including climate and flood regulation, water purification, pollination and pest control
- cultural (including aesthetic, spiritual, educational and recreational) services (WWF 2008, 4)

The methodological and normative problem of valuing biological life and ecological systems in dollar amounts is altogether avoided. Ecological Footprinting can be used to represent human impacts in any possible system of economic organization because the unit of analysis is not dollars, but land area.

The WWF's "Living Planet Report 2008" provides details on both EF concepts and actual data. A more in-depth examination of the WWF framework is instructive in understanding this analytical tool and global patterns of resource consumption. The WWF framework divides a total footprint into six component parts: "built up land, fishing ground, forests, grazing land, cropland, and carbon footprint". These six categories provide a manageable set of variables with the breadth to understand differences in consumption and impact. These categories are summed to provide a total ecological footprint. Footprints can be calculated at individual, regional, and national scales. To illustrate, Appendix Three presents national ecological footprints for several nations, regions, and income classes.

An ecological footprint provides an accessible, meaningful measure of environmental demand, but this figure represents only half of the picture. The other half of the picture is environmental supply or biocapacity. A national land use and ecosystem inventory provides an exciting intersection with EF analysis in this respect.

Chapter 4 established that the most fundamental feature of any ecological indicator system is a measurement of ecosystem extent. There is evidence that someday

this indicator may be formalized as a national land use and ecosystem inventory. This measure can be remotely sensed at relatively low cost and requires little physical sampling of private property. Current sources for these data include the USGS Multiple Land Resolution Characterization (MRLC) Program and Earth Resources Observation System (EROS).

With detailed, publically-available comprehensive national land use and ecosystem data, EF analysis can be conducted at local, regional, and national scales. The ecosystem extent metric proposed by the reports in Chapter Four is the starting point for this effort. Currently, most efforts at ecological footprint analysis such as those of the WWF are conducted at national scales. NEPA as a national policy is not solely about top-down, federal authority to compel or coerce environmental responsibility. Given its emphasis on public involvement and participation, NEPA is only comprehensive to the extent that it provides a framework that can be used by local efforts and integrate the information they produce. With a comprehensive ecosystem inventory in place, the nation can much more accurately evaluate its footprint at all geographic scales. Two simple formulas can be used to operationalize and evaluate environmental impact. The synthesis integrates a national land use and ecosystem inventory and environmental impact at any scales. These formulas are:

Ecological Demand:

$$\text{Population} \times \text{Consumption} \times \text{Resource} / \text{Waste Use Intensity} = \text{Ecological Footprint}$$

Ecological Supply:

Land Area x Bioproductivity = BioCapacity

Ecological Demand – Ecological Supply = Ecological “Overshoot” (WWF 2008, 23)

As can be seen from above, land area is an important term in this series of equations. A national ecological indicator system as proposed by the reports analyzed in Chapter Four would also provide improved quantification of both changes in ecosystem area as well as ecosystem condition. Bioproductivity is directly related to ecosystem condition. This framework provides a quantifiable, yet easily comprehensible, analytical method for directly evaluating environmental impacts. It is applicable at all geographic scales for which the data exist. It is a means for operationalizing, rather simply, a varied, yet manageable set of six specific impacts. These impacts are not abstract, inaccessible concepts but directly relate to humanity’s capacity to sustain itself.

This framework is also a means for better understanding environmental degradation. When environmental demand exceeds environmental supply, overshoot results. Currently, the WWF value for world average ecological footprint is 2.7 global hectares (gha) per person (WWF 2008, 14). The current world biocapacity is 2.1 global gha per person. This results in an overshoot of 0.6 hectares per person.

This overshoot figure represents two processes. First, overshoot degrades the bioproductive capacity of our existing ecosystems. In other words, overshoot diminishes the capacity of these ecosystems to regenerate themselves and provide humanity with the ecosystem services defined above. Second, this overshoot, or “ecological debt” as it is also termed, is effectively the borrowing of natural capital from future generations. Later

generations will inherit ecosystems with degraded biocapacity capable of producing less food, fuel, fiber, and minerals. This ecological debt carries with it the risk that this impaired biocapacity will be insufficient to sustain human life at projected population levels. When major populations and areas of the world are faced with survival challenges, a host of political, national security, social, and ethical issues appear alongside the problems of physical survival. It is a future that a broader audience of policy-makers should be interested in preventing.

### **Relevance of Informational Product to Title I & II**

Thus, a national land use inventory combined with EF provides a method for operationalizing two of NEPA's most difficult aspirations: 1) balancing resource use with population and 2) intergenerational equity. Clearly, population is possibly one of the most difficult, if not the most difficult, policy areas about which to have a rational policy discussion. But this methodology treats it as neutrally as any conceptual framework can. Population is an integral term in these equations as an increase in population requires a decrease in consumption or resource use intensity if a given ecological footprint is to remain constant. Otherwise, the ecological footprint value will increase which produces a corresponding decrease in biocapacity as these resources are overutilized. When these values are simultaneously moving in opposite directions, ecological overshoot is magnified.

Intergenerational equity, or the conservation of the environment for future generations, is a strong theme in NEPA. To the cynic, this language appears as overly ambitious fluff. To the environmental impact analyst using the framework presented

above, intergenerational equity is not simply symbolic language, but something that can be quantified with precision and rigor. Ecological overshoot is the ultimate measure of unsustainability. In a new and rapidly expanding environmental discourse, sustainability is a popular buzzword that may produce a range of definitions. In an EF framework, sustainability is very easy to define as that point where ecological footprint equals available biocapacity. Ecological debt is not being incurred at the expense of future generations. Current generations are valuing obligations to the future through the use of resources relative to their availability. While one perspective may view such considerations as largely aspirational and unattainable, another perspective sees them as instrumental to the civil progress of human society.

The discussion above suggests that a necessary and logical updating of NEPA's comprehensive mandate must include some component of ecological footprint analysis. This incorporation could take a couple of different forms. The first and most obvious form is the resumption of some informational product from CEQ. As Chapter Four demonstrated, this product must be cost-efficient, differentiate itself from the work of EPA, and be accessible to the public.

Thus, some sort of web-based information clearinghouse combining national land use and ecosystem extent data with ecological footprint data and calculators seems appropriate to both CEQ's resources and the larger intent of NEPA. The success of this product should not be measured in its capacity to produce substantive policy change, but rather its reception by the public. It should be designed as an educational tool for secondary education, post-secondary education, and academic research. It should contain

an accessible user interface with graphical presentations, yet also support research efforts by making available various datasets in spreadsheet and GIS formats.

EF analysis might also be incorporated into Title I NEPA processes. Various authors such as Karkainen (2002), as well as the present CEQ, have identified a need to identify environmental mitigation commitments over time. Such efforts also have the potential to be brought into a comprehensive impact framework. Those projects which avoid the EIS process through mitigation should have their mitigation efforts monitored as a unique class of index site, similar to those described in the NSTC framework. Though this site would not be located in a relatively undisturbed ecosystem as many index sites would be, its usefulness to a comprehensive framework would be equally important. Just as there is a need to study structure and function of intact ecosystems, there is also a need to study structure and function of impaired, degraded, or otherwise modified ecosystems. As humanity continues to put more pressure on its ecological supply, increasing areas of bioproductive land will be impacted. These impacts may alter the land completely or they may have more subtle affects on bioproductivity. The extent to which various types of development affects the bioproductivity of surrounding areas is likely to have tremendous importance to the future as more marginal areas will be put to use for purposes of food, fuel, and fiber production. These possible “Mitigation Index Sites” would offer the low documentation benefits of the EA → Mitigated FONSI process, but would make an important scientific and informational contribution to a comprehensive framework.

The established scientific consensus and corresponding public discourse related to climate change suggests its presence as a dominant environmental policy issue for some

time. This shift in both governmental and public perceptions is laudable, but must be understood not just as a measure of carbon ppb. In other words, this problem will require framing in both atmospheric and ecological terms. Forest and marine ecosystems are carbon sinks. Previous carbon balance relationships will be disturbed as these systems are needed to uptake and store increasing amounts of atmospheric carbon. Their capacity to provide this ecological service is directly related to their ecological structure and function. When these are altered, the biocapacity of these systems to perform needed ecological services may be diminished.

Thus, it is clear that any effort to plan for and mitigate effects of climate change must account for ecosystem integrity and function. A system of national ecological indicators and its primary metric of ecosystem extent are instrumental components in ecosystem management of climate change and its effects. The growing use and adoption of carbon footprinting establishes footprinting generally as an accepted, informative, and useful means of operationalizing environmental impact at individual, organizational, regional and national scales. These methods should also be utilized by NEPA.

## Chapter 6: Conclusions and Future Possibilities

At its outset, this analysis asked two primary research questions. The first question asked was, “What impediments prevent the achievement of NEPA’s rational comprehensive focus?” Chapters Two and Three identified bounds to NEPA’s rational comprehensive policy intent. The second question asked was, “How might NEPA resume a comprehensive focus?” Chapters Four and Five provided relevant background and a proposal for resumption of the rational comprehensive policy intent contained in Title II of NEPA.

Concerning the first research question, NEPA is legally constrained by the statute’s lack of positive law, easily interpreted and enforced by the courts. This has led the federal judiciary to interpret NEPA as a procedural statute requiring agency compliance with only one line of the act – Section 102(2)(c) – the EIS requirement. While the EIS “hard look” test that has evolved in the courts has surely led some damaging projects to be cancelled or modified, the hard look test is now being applied less, in favor of less rigorous NEPA processes with fewer alternatives analyzed and less public involvement.

Administratively, NEPA has been affected by three decades of political interference with CEQ and Title II. Distinctions between White House Staff and the Executive Office of the President have blurred over time making CEQ subject to the priorities of the Executive and offering it scarce autonomy. The legislative branch has also failed to understand the role of CEQ. Its lack of support culminated in the elimination of CEQ’s annual environmental report in 1995.

Despite this setback, CEQ and a range of other policy actors made forward progress on the development of a national ecological indicator system during the late 1990s and early 2000s. Although a system has not been adopted as of yet, this period was productive in terms of progress on conceptualization, methodological challenges, and institutional issues. Each indicator development proposal cites “ecosystem extent” as the primary metric in any larger framework. These efforts demonstrate a need for comprehensive environmental information currently absent from the federal government. A call for national ecological indicators also suggests an answer to the second question research question of, “How might NEPA resume a comprehensive focus?”

One alternative is presented in this paper. A possible national land use and ecosystem inventory can be tightly integrated into Ecological Footprinting as a methodology for national impact analysis. Such a framework offers the sometimes competing benefits of both quantitative rigor and conceptual accessibility. It is applicable to local, regional, and national scales making it a truly comprehensive form of impact analysis. It reinforces private sector efforts at environmental responsibility and can provide oversight and guidance with respect to methodological rigor. It addresses NEPA aspirations that are difficult to operationalize such as intergenerational equity. A web-based informational product using this methodology is within CEQ’s resource constraints and can make considerable use of existing datasets. This product would also be a contribution unique from those being developed by U.S. EPA.

As Chapter Three demonstrated, the future possibility of restoring NEPA’s comprehensive mandate depends on the political will of our national leadership. Much of the progress toward ecological indicator development occurred during a Presidential

administration that showed little interest or concern for environmental issues beyond the creation of several offshore marine sanctuaries. Thus, comprehensiveness in environmental information should never really be considered a “dead” issue, just one that is temporarily at the margins of the environmental policy discourse.

Another alternative is to leave this issue at the edge of our national priorities and take no action to restore NEPA’s comprehensive mandate. This alternative is problematic in several respects. In broad terms, it perpetuates a disconnect between the environment and human welfare. Our world economy views ecosystems as a source of wealth creation. Society needs competing or companion institutions that more fully acknowledge ecosystems as the source of life creation. Only in recent decades has humanity begun to understand the full range of ecosystem services provided to human society. Future adaptation to climate change will surely require a broad-scale approach, integrating not only atmospheric science but also ecosystem science as several terrestrial and marine ecosystems function as important carbon sinks. The necessity of high quality information for decision-making on global climate issues may provide a future policy window whereby a national ecological indicator system gains traction.

Whether CEQ is a capable home for such endeavors will remain to be seen. As acknowledged earlier, locating any new initiative in CEQ carries risks. It has not been a well understood or supported institution of federal government. It is, however, entirely unique in federal government with its institutionalization of local ecological impacts in Title I and a comprehensive mandate in Title II. The challenges of comprehensiveness have been well documented in this paper using NEPA as a case example and in a range of planning and policy literature. NEPA nor its drafters deserve blame for the difficulty of

implementing comprehensive policy. Yet as Chapter Four reveals, a demand for comprehensiveness exists. Structured properly, a comprehensive ecological information system would improve the Nation's overall understanding of the environment and may foster better decision-making.

In many ways, NEPA and CEQ have already made their contribution to environmental science and policy. The creation of environmental impact analysis has prompted numerous other efforts in measuring, conceptualizing, and managing environmental problems. An entire field of practice and study was initiated with the passage of NEPA and a new national policy focus created (Bartlett 1985a). A history of the evolution of environmental impact analysis appears to be missing from environmental science and policy scholarship. This history would be a useful contribution. Though such a history was not the analytical focus of this project, it deserves full acknowledgement. And while this thesis may read as overly critical of NEPA at times, it does so out of respect for this statute and its importance to humanity and the planet which sustains it. The statute confronts issues which will no doubt increase in scale, complexity, and importance in future decades and centuries.

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## **Appendix A: The National Environmental Policy Act of 1969**

### **The National Environmental Policy Act of 1969**, as amended

(Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982)

An Act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That this Act may be cited as the "National Environmental Policy Act of 1969."

#### **Purpose**

##### **Sec. 2 [42 USC § 4321].**

The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

## **TITLE I**

### **CONGRESSIONAL DECLARATION OF NATIONAL ENVIRONMENTAL POLICY**

#### **Sec. 101 [42 USC § 4331].**

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations

of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

**Sec. 102 [42 USC § 4332].**

The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall --

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) Any detailed statement required under subparagraph (C) after January 1, 1970, for any major Federal action funded under a program of grants to States shall not be deemed to be legally insufficient solely by reason of having been prepared by a State agency or official, if:

(i) the State agency or official has statewide jurisdiction and has the responsibility for such action,

(ii) the responsible Federal official furnishes guidance and participates in such preparation,

(iii) the responsible Federal official independently evaluates such statement prior to its approval and adoption, and

(iv) after January 1, 1976, the responsible Federal official provides early notification to, and solicits the views of, any other State or any Federal land management entity of any action or any alternative thereto which may have significant impacts upon such State or affected Federal land management entity and, if there is any disagreement on such impacts, prepares a written assessment of such impacts and views for incorporation into such detailed statement.

The procedures in this subparagraph shall not relieve the Federal official of his responsibilities for the scope, objectivity, and content of the entire statement or of any other responsibility under this Act; and further, this subparagraph does not affect the legal sufficiency of statements prepared by State agencies with less than statewide jurisdiction.

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(H) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(I) assist the Council on Environmental Quality established by title II of this Act.

**Sec. 103 [42 USC § 4333].**

All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

**Sec. 104 [42 USC § 4334].**

Nothing in section 102 [42 USC § 4332] or 103 [42 USC § 4333] shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

**Sec. 105 [42 USC § 4335].**

The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

## **TITLE II**

### **COUNCIL ON ENVIRONMENTAL QUALITY**

**Sec. 201 [42 USC § 4341].**

The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

**Sec. 202 [42 USC § 4342].**

There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, aesthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

**Sec. 203 [42 USC § 4343].**

(a) The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

(b) Notwithstanding section 1342 of Title 31, the Council may accept and employ voluntary and uncompensated services in furtherance of the purposes of the Council.

**Sec. 204 [42 USC § 4344].**

It shall be the duty and function of the Council --

1. to assist and advise the President in the preparation of the Environmental Quality Report required by section 201 [42 USC § 4341] of this title;
2. to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;
3. to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;
4. to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;
5. to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;
6. to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;
7. to report at least once each year to the President on the state and condition of the environment; and
8. to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

**Sec. 205 [42 USC § 4345].**

In exercising its powers, functions, and duties under this Act, the Council shall --

1. consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order No. 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and
2. utilize, to the fullest extent possible, the services, facilities and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

**Sec. 206 [42 USC § 4346].**

Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates [5 USC § 5313]. The other members of the Council shall be compensated at the rate provided for Level IV of the Executive Schedule Pay Rates [5 USC § 5315].

**Sec. 207 [42 USC § 4346a].**

The Council may accept reimbursements from any private nonprofit organization or from any department, agency, or instrumentality of the Federal Government, any State, or local government, for the reasonable travel expenses incurred by an officer or employee of the Council in connection with his attendance at any conference, seminar, or similar meeting conducted for the benefit of the Council.

**Sec. 208 [42 USC § 4346b].**

The Council may make expenditures in support of its international activities, including expenditures for: (1) international travel; (2) activities in implementation of international agreements; and (3) the support of international exchange programs in the United States and in foreign countries.

**Sec. 209 [42 USC § 4347].**

There are authorized to be appropriated to carry out the provisions of this chapter not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.

**The Environmental Quality Improvement Act**, as amended (Pub. L. No. 91- 224, Title II, April 3, 1970; Pub. L. No. 97-258, September 13, 1982; and Pub. L. No. 98-581, October 30, 1984.

**42 USC § 4372.**

(a) There is established in the Executive Office of the President an office to be known as the Office of Environmental Quality (hereafter in this chapter referred to as the "Office"). The Chairman of the Council on Environmental Quality established by Public Law 91-190 shall be the Director of the Office. There shall be in the Office a Deputy Director who shall be appointed by the President, by and with the advice and consent of the Senate.

(b) The compensation of the Deputy Director shall be fixed by the President at a rate not in excess of the annual rate of compensation payable to the Deputy Director of the Office of Management and Budget.

(c) The Director is authorized to employ such officers and employees (including experts and consultants) as may be necessary to enable the Office to carry out its functions ;under this chapter and Public Law 91-190, except that he may employ no more than ten specialists and other experts without regard to the provisions of Title 5, governing appointments in the competitive service, and pay such specialists and experts without regard to the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates, but no such specialist or expert shall be paid at a rate in excess of the maximum rate for GS-18 of the General Schedule under section 5332 of Title 5.

(d) In carrying out his functions the Director shall assist and advise the President on policies and programs of the Federal Government affecting environmental quality by --

1. providing the professional and administrative staff and support for the Council on Environmental Quality established by Public Law 91- 190;
2. assisting the Federal agencies and departments in appraising the effectiveness of existing and proposed facilities, programs, policies, and activities of the Federal Government, and those specific major projects designated by the President which do not require individual project authorization by Congress, which affect environmental quality;
3. reviewing the adequacy of existing systems for monitoring and predicting environmental changes in order to achieve effective coverage and efficient use of research facilities and other resources;
4. promoting the advancement of scientific knowledge of the effects of actions and technology on the environment and encouraging the development of the means to prevent or reduce adverse effects that endanger the health and well-being of man;
5. assisting in coordinating among the Federal departments and agencies those programs and activities which affect, protect, and improve environmental quality;
6. assisting the Federal departments and agencies in the development and interrelationship of environmental quality criteria and standards established throughout the Federal Government;
7. collecting, collating, analyzing, and interpreting data and information on environmental quality, ecological research, and evaluation.

(e) The Director is authorized to contract with public or private agencies, institutions, and organizations and with individuals without regard to section 3324(a) and (b) of Title 31 and section 5 of Title 41 in carrying out his functions.

**42 USC § 4373.** Each Environmental Quality Report required by Public Law 91-190 shall, upon transmittal to Congress, be referred to each standing committee having jurisdiction over any part of the subject matter of the Report.

**42 USC § 4374.** There are hereby authorized to be appropriated for the operations of the Office of Environmental Quality and the Council on Environmental Quality not to exceed the following sums for the following fiscal years which sums are in addition to those contained in Public Law 91- 190:

- (a) \$2,126,000 for the fiscal year ending September 30, 1979.

- (b) \$3,000,000 for the fiscal years ending September 30, 1980, and September 30, 1981.
- (c) \$44,000 for the fiscal years ending September 30, 1982, 1983, and 1984.
- (d) \$480,000 for each of the fiscal years ending September 30, 1985 and 1986.

**42 USC § 4375.**

- (a) There is established an Office of Environmental Quality Management Fund (hereinafter referred to as the "Fund") to receive advance payments from other agencies or accounts that may be used solely to finance --
  - 1. study contracts that are jointly sponsored by the Office and one or more other Federal agencies; and
  - 2. Federal interagency environmental projects (including task forces) in which the Office participates.
- (b) Any study contract or project that is to be financed under subsection (a) of this section may be initiated only with the approval of the Director.
- (c) The Director shall promulgate regulations setting forth policies and procedures for operation of the Fund.

## Appendix B: Summary Matrix of Ecological Indicator Proposals, 1997-2007

YEAR	AUTHOR	TITLE	Physical Indicators Proposed?	Proposed Coordinating Agency	Institutional / Political Discussion?
1997	National Science and Technology Council	Integrating The Nation's Environmental Monitoring and Research Networks and Programs: A Proposed Framework	no, scales and objectives of monitoring	none	slight mention
1999	Heinz Center	Designing a Report on the State of the Nation's Ecosystems.	yes, 11 core indicators in 4 categories	none	no, clearly avoided
2002	Heinz Center	The State of the Nation's Ecosystems: Measuring the Lands, Waters, and Living Resources of the United States.	yes, 11 core indicators in 4 categories	none	no, clearly avoided
2000	National Research Council	Ecological Indicators for the Nation	yes, 11 core indicators in 3 categories	EPA	very slight mention
2003	EPA	Draft Report on the Environment Technical Document	yes, 7 ecosystem classes proposed with 6-10 metrics per class	EPA	No
2004	GAO	Environmental Indicators: Better Coordination is Needed to Develop Environmental Indicator Sets that Inform Decisions	no, report surveys past efforts and contains in-depth process discussion	various	yes, detailed
2007	National Academy of Public Administration	Green Compass: Institutional Options for Developing a National System of Environmental Indicators	no	not CEQ; prefers OMB or OSTP	yes, detailed

### Appendix C: Selected Ecological Footprints by Income Group, Region, and Nation

	Population (millions)	Total EF/person	Carbon	Cropland	Grazing land	Forest	Fishing Ground	Built land
<b>Income Groups</b>								
High Income Group	972.0	6.4	4.04	1.15	0.28	0.61	0.17	0.13
Middle Income Group	3,099.0	2.2	1	0.62	0.22	0.18	0.09	0.08
Low Income Group	2,371.0	1	0.26	0.44	0.09	0.15	0.02	0.05
<b>Regions</b>								
Africa	902.0	1.4	0.26	0.54	0.25	0.24	0.03	0.05
Middle East & Central Asia	365.6	2.3	1.34	0.69	0.08	0.08	0.04	0.08
Asia-Pacific	3,562.0	1.6	0.78	0.49	0.08	0.13	0.07	0.06
Latin America & Caribbean	553.2	2.4	0.65	0.57	0.72	0.32	0.1	0.08
North America	330.5	9.2	6.21	1.42	0.32	1.02	0.11	0.1
Europe - EU	487.3	4.7	2.58	1.17	0.19	0.48	0.1	0.17
Europe - Non-EU	239.6	3.5	2	0.94	0.04	0.29	0.17	0.07
<b>Countries</b>								
United States (2nd Highest)	298.2	9.4	6.51	1.38	0.9	1.02	0.1	0.1
United Arab Emirates (High)	4.5	9.5	7.82	1.03	0.03	0.37	0.21	0
Nicaragua (at biocapacity)	5.5	2	0.41	0.4	0.71	0.35	0.1	0.07
Afghanistan (2nd Low)	29.9	0.5	0	0.27	0.1	0.05	0	0.06
Malawi (Low)	12.9	0.5	0.07	0.21	0	0.15	0	0.03
China	1,323.3	2.1	1.13	0.56	0.15	0.12	0.07	0.07
World	6,476.0	2.7	1.41	0.64	0.26	0.23	0.09	0.07

Source: World Wildlife Fund. Living Planet Report 2008. Gland, Switzerland: Repress.