

Integration of Ecosystem Services Valuation Analysis into National Environmental Policy Act Compliance

Legal and Policy Perspectives

Dinah Bear



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About the Author

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Foreword

Natural areas provide a host of benefits to people—benefits that could be diminished if threats to natural areas are realized. At the same time, funds to protect these areas are dwindling. Consequently, resource managers are increasingly faced with decisions involving tradeoffs, whereby an increase in or preservation of one ecosystem service or benefit comes at the cost of another. The consequences of such decisions sometimes occur across traditional boundaries and responsibilities, requiring managers to consider geographic areas outside their jurisdictions and to think about ecological effects beyond their typical priorities. Such decisions are further complicated by the difficulty of quantifying important benefits not valued by traditional markets—for example, the cultural, aesthetic, and water regulation benefits provided by natural areas. In making tradeoffs, decision makers are likely to overlook benefits that are not quantified. In consideration of these tradeoffs and their potential effect on human well-being, U.S. policies and guidance have begun to incorporate ecosystem services and the benefits they provide into natural resource planning and management.

Federal dialogue on ecosystem services was sparked by the 1998 President's Council of Advisors on Science and Technology (PCAST) report *Teaming with Life: Investing in Science to Understand and Use America's Living Capital*. A decade later, the U.S. Farm Bill called for federal agencies to explore ecosystem services and their potential application in environmental markets, resulting in establishment of the U.S. Department of Agriculture's Office Environmental Markets. In 2010, appointees from federal agencies with natural resource jurisdictions met to explore markets and payments for ecosystem services. Since then, several events have advanced federal agencies' consideration of ecosystem services approaches to natural resource planning and management:

- In 2011 the PCAST issued *Sustaining Environmental Capital: Protecting Society and the Economy*, a report which asserts the critical importance of the environment for the economy and to societal well-being and which emphasizes the need for agencies to develop consistent ecosystem services valuation techniques across federal agencies.
- The U.S. Forest Service's 2012 Planning Rule required that planning activities consider ecosystem services as part of an integrated resource management focus. The agency is moving quickly to phase in implementation of the rule.
- In 2013, the White House Council on Environmental Quality released new principles and requirements for federal investments in water resources. These principles and requirements include guidance on using an ecosystem services evaluation framework for water resources projects.
- Other agencies, including the Bureau of Land Management, Fish and Wildlife Service, U.S. Geological Survey, the U.S. Army Corps of Engineers, the Environmental Protection Agency, and the National Oceanic and Atmospheric Administration, have begun assessing and testing methods for identifying and valuing ecosystem services as they move toward applying them in decisions about natural resource management.

Agency leaders and resource managers are increasingly encouraging their staff to consider ecosystem services in their planning and management decisions. At the same time, they recognize multiple challenges to operationalizing this new approach. These challenges include (1) a lack of capacity and tools to identify, assess, and incorporate ecosystem services into planning and management processes; (2) institutional resistance to a new idea with still-developing methods; (3) institutional limits to cross-agency sharing and coordinated use of methods and tools; and (4) concern about the credibility and defensibility of the methods within the context of the planning process and agencies' legal authorities. This concern was the subject of a 2012 workshop led by the National Ecosystem Services Partnership (NESP) and A Community on Ecosystem Services (ACES).

To address these challenges, NESP launched the Federal Resource Management and Ecosystem Services (FRMES) project to develop credible approaches for incorporating ecosystem services into natural resource planning and management. The culmination of this project is an online guidebook that describes how these approaches can be useful for federal resource planners and managers. In addition, it examines how federal agencies are exploring or applying the ecosystem services concept. It also provides a framework and methodology to enhance the consistency of ecosystem services approaches. This legal paper is one of two that will appear in the guidebook. The papers describe the legal foundations for agency use of ecosystem services approaches to planning and management, thereby laying the groundwork for the guidebook. They explain how the National Environmental Policy Act and the Federal Land Management and Policy Act of 1976 enable or limit agencies' incorporation of ecosystem services approaches into federal planning and management processes.

Introduction

Federal agencies do not commonly undertake analysis of the value of ecosystem services potentially affected by their proposed actions. Although such analysis is an appropriate component of and consistent with compliance with the National Environmental Policy Act (NEPA),¹ as that law's history and purpose, statutory language, and regulatory direction make clear, it is stymied by at least four barriers. Nevertheless, NEPA compliance is required for a broad variety of federal programs, plans, and policies. Such analysis enhances understanding of ecosystem services and helps to fulfill both the public policy purposes and the legal requirements of NEPA.

NEPA's History and Purpose

In the 1950s, a few members of Congress began to articulate a federal role in protecting the nation's environment.² Catalyzing the movement to legislate to address harm to the environment were some highly visible environmental disasters in the 1960s and Rachael Carson's book *Silent Spring*, which documented the effects of pesticides on birds and the 1968 oil spill off Santa Barbara, California. Tarded and dead birds, fouled waters, and heavy smog fanned the activism of the 1960s into a movement to save the environment that gained widespread and strong bipartisan support.

In the summer of 1968, Congress convened the joint, bipartisan Senate-House "Colloquium to Discuss a National Policy for the Environment." The colloquium included scientists, members of the academic community, business leaders, executive branch officials, and other participants outside of the legislative branch. It resulted in the *Congressional White Paper on a National Policy for the Environment*.³ The letter of submittal to Congress accompanying the paper stated that "The Congress is the only institution having the scope to deal with the broad range of man's interactions with his physical-biological surroundings. We therefore believe that leadership toward a national environmental policy is our responsibility."⁴

The white paper reflected colloquium participants' deep thought about the relationship between the physical environment and economics. For example, Secretary of the Interior Stewart Udall observed that "The real wealth of the country is the environment in the long run. We must reject any approach which inflates the values of today's satisfaction and heavily discounts tomorrow's resources."⁵ There was much discussion about "broadening the scope of cost accounting," and "narrow utilitarian views governing the use of environmental resources" were cited as the root of many conflicts as well as a major barrier to sound environmental management.⁶ The participants believed that finding "equitable ways of charging for environmental abuses within the traditional free-market economy" was vital.⁷ But there was also recognition that "The benefits of preventing quality and productivity deterioration of the environment are not always measurable in the marketplace. Ways must be found to add to cost-benefit

¹ 42 U.S.C. §§ 4321-4321.

² The first NEPA-like legislation was introduced in 1959 by Senator James E. Murray from Montana. His bill, S. 2549, the Resources and Conservation Act, would have established a mechanism in the Executive Office of the President to coordinate resource conservation on the basis of identified national goals. For an authoritative discussion of the work preceding NEPA's development and passage, see, Caldwell, Lynton Keith, *The National Environmental Policy Act*, Indiana University Press, 1998.

³ Submitted to the U.S. Congress under the Auspices of the Committee on Interior and Insular Affairs and the Committee on Science and Astronautics, GPO, October 1968.

⁴ Letter of submittal, *White Paper, Id.*

⁵ *Id.* at 2.

⁶ *Id.* at 3.

⁷ *Id.* at 2.

analyses nonquantifiable, subjective values for environmental amenities, which cannot be measured in conventional economic terms.”⁸

On October 8, 1968, the same day that the white paper was published in the *Congressional Record*, Senator Henry Jackson from the state of Washington called for the Senate to appoint conferees to deliberate on the Senate-passed National Environmental Policy Act and the House-passed bill, H.R. 12549.⁹ In discussing the bills, he relied heavily on a report that had been prepared for the House-Senate colloquium by Professor Lynton K. Caldwell, then chairman of the Department of Government at Indiana University, with the assistance of Bill Van Ness, Senator Jackson’s special counsel.¹⁰ The report emphasized the importance of recognizing the costs of environmental deterioration. The report noted that it has:

been poor business, indeed, to be faced with the billions of dollars in expense for salvaging our lakes and waterways when timely expenditures of millions or timely establishment of appropriate policies would have largely preserved the amenities that we have lost and would have made unnecessary the cost of attempted restoration. A national system of environmental cost accounting expressed not only in economic terms but also reflecting life-sustaining and amenity values in the form of environmental quality indicators could provide the Nation with a much clearer picture than it now has of its environmental condition. It would help all sectors of America to cooperate in avoiding the overdrafts on the environment and the threat of ecological insolvency that are impairing the national economy today.¹¹

Throughout the discussion of NEPA, Senator Henry Jackson made it clear that the philosophical and legal framework of NEPA was intended to embrace human beings and human needs of all kinds. NEPA’s most quoted provision, which requires preparation of environmental impact statements, contains the phrase “the human environment.”¹² That phrase signals that the impacts to be analyzed are not only humans’ impact on the physical environment but the impacts of the environment on people. As Senator Jackson explained, “When we speak of the environment, basically, we are talking about the relationship between man and these physical and biological and social forces that impact upon him. A public policy for the environment basically is not a public policy for those things out there. It is a policy for people.”¹³

The polluted Cuyahoga River burst into flames in the summer of 1969, adding further support for Congressional action. By the end of the year, Congress had passed NEPA, and President Nixon signed the act into law on January 1, 1970.¹⁴ In his remarks on signing NEPA, the president praised the Congress’s actions, committed to quick nominations for highly qualified persons for the Council positions, and said all levels of government and the public had to be involved in protecting the environment because “It is literally now or never.”¹⁵

⁸*Id.* at 16.

⁹ S.1075. October 8, 1969.

¹⁰ “A National Policy for the Environment,” prepared for the Committee on Interior and Insular Affairs, July 11, 1968.

¹¹ *Congressional Record*, vol. 115, no. 164, October 8, 1969, Senate, p. 5.

¹² Section 102(2) (C) of NEPA requires federal agencies to prepare “detailed statements” (now known as an EIS) for “every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.”

¹³ Hearings on S.1075, S.237, and S. 1752, Senate Committee on Interior and Insular Affairs, 91st Cong., 1st Sess. 118 (1969).

¹⁴ Pub. L. 91-190.

¹⁵ President Richard M. Nixon, “Statement about the National Environmental Policy Act of 1969,” January 1, 1970, *Public Papers of the Presidents*, January 1, 1970.

Statutory Provisions

Unlike many other environmental statutes, NEPA focuses on no one activity, nor is it an anti-pollution law, as first reported by the *New York Times*.¹⁶ Although it is certainly within the scope and purpose of the law to foresee and prevent pollution, NEPA focuses on interactions between human beings and the physical environment. It speaks to

. . . 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.¹⁷

Further, the federal government is charged with using

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.¹⁸

Congress specifically directed all federal agencies to

(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;¹⁹ and
(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.²⁰

¹⁶ Caldwell, Lynton Keith, *The National Environmental Policy Act*, Indian University Press, 1998, pp. 37-38.

¹⁷ 42 U.S.C. §4331(a) (emphasis added).

¹⁸ 42 U.S.C. § 4331(b).

¹⁹ 42 U.S.C. 4332(A).

²⁰ 42 U.S.C. §4332(B).

Congress deliberately chose the term “human environment” to signal that the required analysis under NEPA should not focus on, as Dr. Caldwell once said, “those trees out there,” but rather on the interaction of trees and human beings—the impact of each on the other.²¹ It is equally clear that Congress did not intend for the analysis to be solely the domain of scientists focusing on the natural and physical world, but also that of social scientists, economists, physicians, and others focused on the human world. Congress understood the difficulty of precisely denominating the economic value of all aspects of the environment and allowed qualitative as well as quantitative analytical work to be considered in the course of agency decision making.

Importantly, Congress also made the policies and goals set forth in NEPA supplementary to federal agencies’ existing authorities.²² It directed that, *to the fullest extent possible*, 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.”²³

Regulatory Direction

NEPA established the Council on Environmental Quality (CEQ) to oversee the law’s implementation.²⁴ The CEQ issued guidelines and, later, regulations requiring all executive branch agencies to implement NEPA’s procedural provisions. Early in the evolution of guidance to executive branch agencies, the CEQ recognized that significant adverse effects of potential agency actions included those that “curtail the range of beneficial uses of the environment.”²⁵

CEQ regulations reiterate the statutory provisions that require the use of an inter-disciplinary approach to “insure the integrated use of the natural and social sciences,”²⁶ and to take into account any analyses of unquantified environmental impacts, values, and amenities, along with any quantification prepared by way of a cost-benefit analysis.²⁷ “Effects” to be analyzed in any level of analysis include direct, indirect, and cumulative effects on natural systems, including ecosystems, land use, population density or growth rate; effects on natural resources and on the components, structures, and functioning of affected ecosystems; and aesthetic, historic, cultural, economic, social, and health impacts.²⁸ Analysis of both beneficial and adverse impacts must be included.²⁹ Finally, the regulations require that the key term “human environment” “shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment.”³⁰

In short, the intent and requirements of both the statute and the regulations are completely consistent with, and indeed advanced by, integration of an analysis of ecosystem services valuation in the NEPA process. As one law review writer has stated, “Valuation of ecosystem services is exactly the kind of assessment NEPA envisions, providing a means to inform the public and decision-makers about what

²¹ Personal communication from Dr. Caldwell to author, June 2005.

²² 42 U.S.C. § 4335 (incorporated into CEQ’s regulations at 40 C.F.R. § 1500.6).

²³ 42 U.S.C. § 4332 (emphasis added).

²⁴ 42 U.S.C. §§ 4342 – 4347.

²⁵ “Guidelines, Statements on Proposed Federal Actions Affecting the Environment,” *Federal Register* vol. 36, no. 79, p. 7725, §5(c), April 23, 1971; see similar language in “Guidelines, Preparation of Environmental Impact Statements,” *Federal Register* vol. 38, no. 147, p. 20551, § 15006(b).

²⁶ 40 C.F.R. §§1502.6, 1507.2.

²⁷ 40 C.F.R. §1502.23.

²⁸ 40 C.F.R. § 1508.8.

²⁹ 40 C.F.R. § 1508.8(b).

³⁰ 40 C.F.R. § 1508.14.

we stand to gain or lose in several alternative scenarios.”³¹ Similarly, a 2013 report from the U.S. Army Corps of Engineers’ Institute for Water Resources noted that

As a foundational environmental law that requires agencies to evaluate the consequences of a full range of alternative ways to pursue goals before acting, NEPA seems particularly supportive of considering EGS [ecosystem goods and services] information in water resources planning. NEPA requires the consideration of all direct, indirect and cumulative effects of each alternative on significant resources. The consideration of, if not the valuation or quantification of EGS, could contribute to informing the public and decision makers about potential gains and losses in EGS from alternative plans and scenarios. NEPA also includes provisions for considering activities at the programmatic level, allowing for analysis of regional or national effects. Information about EGS could inform those analyses.³²

In short, federal agencies would be hard pressed to articulate an argument against inclusion of analyses of ecosystem services likely to be affected by proposed actions, and yet they are not routinely conducting such analyses.

Barriers to Ecosystem Services Analyses

Analysis and valuation of ecosystem services appears to be both within the legal scope of NEPA and potentially quite useful in meeting NEPA’s goals and requirements, yet federal agencies are not undertaking these activities. Among the barriers to these activities are misunderstanding of NEPA, lack of familiarity with ecosystem services concepts, lack of demand for ecosystem services valuation by members of the public and public interest groups, and lack of capacity.

Misunderstanding of NEPA

In the wake of the dramatic disasters of the 1960s and early 1970s, NEPA’s enactment and early implementation were focused almost exclusively on how human beings adversely affected the environment. Legal and political actions, literature, and popular media all focused on what human beings were doing to the environment. This formulation often made it appear that human beings were not part of the environment but rather an outside (and deleterious) force on it.

Completely overlooking the phrase “human environment” and the rich legislative history behind that phrase, one early legal case suggested that NEPA did not define “environment” and speculated that it did not cover human beings.³³ A decision in another early NEPA-related case contained the somewhat puzzling observation that, “environmental problems in the city are not as readily identifiable as clean air and clean water.”³⁴

³¹ Robert Fischman, *The EPA’s NEPA Duties and Ecosystem Services*, Stanford Environmental Law Journal, vol. 20: 497, 501. Professor Fischman’s articles analyze ecosystem services in the context of the review required under Section 309 of the Clean Air Act by the Environmental Protection Agency of EISs.

³² Denise Reed, Lynn Martin, and Janet Cushing, *Using Information on Ecosystem Goods and Services in Corps Planning: An Examination of Authorities, Policies, Guidance, and Practices*. Institute for Water Resources, U.S. Army Corps of Engineers, September 2013. http://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/EGS_Policy_Review_2013-R-07.pdf.

³³ *Clinton Community Hospital Corp. v. Southern Maryland Medical Center*, 374 F. Supp. 450 (D. Md. 1974). No other cases have followed this line of reasoning when plaintiffs have demonstrated that the proposed action would cause some impact on the physical environment.

³⁴ *Nucleus of Chicago Homeowners Ass’n. v. Lynn*, 524 F.2d 225, 229 (7th Cir. 1975).

The majority of early cases, however, clearly established that NEPA's coverage included the urban environment and impacts on human beings. They also established that the impacts to be analyzed included not just air and water impacts. In *Hanley v. Mitchell*, the Court of Appeals for the Second Circuit ruled the law's coverage

extends beyond sewage and garbage and even beyond water and air pollution The Act must be construed to include protection of the quality of life for city residents. Noise, traffic, over-burdened mass transportation systems, crime, congestion, and even availability of drugs all affect the urban 'environment' and are surely results of the 'profound influences of high density urbanization [and] industrial expansion [citing Section 101(a) of NEPA].³⁵

Another case specifically refuted the notion relied on in the *Clinton Community Hospital* decision that the "human environment" does not cover human beings.³⁶ In that case, involving the proposed use of federal funds for acquisition of a site for a correction facility, the court observed that

A review of NEPA's language casts some doubt upon the contention that the environment does not include human beings. . . . The statute is replete with references to the interrelationship of man and his surroundings and concern for human welfare. An examination of judicial decision in the area demonstrates the term reaches just about everything important to people, including crime and overpopulation, race relations, employment and the availability of schools and housing.³⁷

Cases alleging inadequate economic analysis, when brought by a party that meets the prudential requirements for being in the "zone of interest" covered by NEPA (i.e., that there must be some tie to the physical environment), have been successful.³⁸ On the other hand, plaintiffs whose interest is identified as solely economic competition have generally not been considered to be within the appropriate zone of interest.³⁹

Contributing to the lingering perception that NEPA does not cover human beings or impacts on human beings are some cases from the 1970s brought on behalf of plaintiffs who stood to suffer economically in the event of proposed post-Vietnam War military installation closures and reductions-in-force actions. The pleadings were devoid of any allegations regarding environmental effects per se, and the courts ruled in favor of the government, holding that to be cognizable under NEPA, complaints had to allege some nexus between a proposed action and the physical environment.⁴⁰ This holding was codified in CEQ's NEPA regulations requiring environmental impact statements (EISs) to address any interrelated socioeconomic and natural or physical environmental effects.⁴¹

Further contributing to the perception that NEPA does not cover human beings or impacts on them is a Supreme Court decision dealing with the restart of one of the nuclear power plant units at Three Mile Island following the accident there in March 1979. The reactor proposed for restart was not operating at the time of the accident, but a group of local residents deeply feared and strongly opposed its restart.

³⁵ *Hanley v. Mitchell*, 460 F.2d 640 (2nd Cir. 1972).

³⁶ *Id.* at fn. 30.

³⁷ *Monarch Chemical Works, Inc. v. Exxon*, 452 F. Supp. 493 (D. Neb. 1978), judgment aff'd., 604 F. 2d 1083 (8th Cir. 1979).

³⁸ *Natural Resources Defense Council v. Duvall*, 777 F. Supp. 1553 (E. Calif. 1991).

³⁹ *Benton County Sav. and Loan Ass'n. v. Federal Home Loan Bank Bd.*, 450 F. Supp. 884 (W.D. Ark. 1978).

⁴⁰ *Image of Greater San Antonio v. Brown*, 570 F.2d 517 (5th Cir. 1978); *Breckinridge v. Rumsfeld*, 537 F.2d 864 (6th Cir. 1976); *National Ass'n of Government Emp. V. Rumsfeld*, 418 F. Supp. 1302 (1976).

⁴¹ 40 C.F.R. § 1508.14. Some have misinterpreted this regulation to mean that social and economic effects are not to be analyzed in environmental assessments. CEQ's definition of effects applies to EAs just as to EISs.

They asked the Nuclear Regulatory Commission to include in its EIS for the unit’s restart an analysis of the psychological harm they would likely experience as a result of their fears (as opposed to the actual restart). In its decision in *Metropolitan Edison Co. v. People Against Nuclear Energy*, the Supreme Court unanimously held that, “All the parties agree that effects on human health can be cognizable under NEPA, and that human health may include psychological health.”⁴² The court went on to find that under the facts alleged, the causation between possible harm to the plaintiffs as a result of their fears and the act of restarting the unit in question was too attenuated to pass muster under “proximate cause,” a legal theory used in tort law. This opinion—the first to introduce proximate cause in the context of a NEPA case—has been misinterpreted to stand for a variety of inaccurate propositions: that NEPA does not cover human beings, that it does not include human health impacts, and that it does not include psychological health impacts despite the court’s making it clear that human health, generally, and psychological health, in particular, are cognizable under NEPA.⁴³

Finally, there is a widespread assumption that EISs should focus solely on adverse impacts from projects when, in fact, neither the law nor regulations support that notion. CEQ’s regulations explain that the effects to be analyzed under NEPA “include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.”⁴⁴ This stipulation is important for three reasons: (1) the characterization of an effect may vary with an individual’s perspective; (2) even an action intended to improve the environment may benefit from an analysis of alternative ways of achieving that goal; and (3) ultimately, decision makers must make a judgment about the benefits versus the negative impacts of a proposal. The commonplace but faulty belief that NEPA applies only to adverse impacts undermines analysis of the value of ecosystem services and the impacts that a proposed action and alternative actions would have on them in the context of an EIS or environmental assessment.

Analysis of ecosystem services, of course, focuses not just on humans’ impacts on the physical environment but also on the environment’s contribution to human society. The combination of the political atmosphere surrounding NEPA’s passage, early judicial decisions, and the tendency to think of NEPA in terms of adverse impacts may have reinforced a view that impacts on human beings (and thus, the issue of ecosystem services) have a “second class” status under NEPA despite Congress’s carefully chosen phrase—“the human environment”—to frame the statute. The result is that federal agencies hire scientists with expertise in the natural and physical environment—but not social scientists and economists—to work on NEPA-related analyses.

Lack of Familiarity with Ecosystem Service Concepts

Academic literature has addressed the concept of ecological services since the early 1970s, yet a survey by the Udall Center for Studies in Public Policy of project managers, interdisciplinary team members, and decision makers who had worked on NEPA documents in 2011 and 2013 showed that 41% of the 524 respondents were still totally unfamiliar with the concept. Another 42% were somewhere familiar

⁴² 460 U.S. 766, 771 (1983).

⁴³ The confusion about the role of human beings as being part of, not separate from, the “human environment” has had an impact in the context of issues beyond ecosystem services. For example, although the word “health” is referenced in NEPA and included in CEQ’s regulatory definition of the type of impacts that must be analyzed, health impacts in NEPA documents have typically been ignored or addressed only in a very narrow sense. Ironically, many countries—including Australia, Canada, and Thailand—and international bodies, including the European Union, have developed a model of “health impact assessment” based on NEPA’s model of environmental impact assessment. Much work also has been done to reintegrate health impacts into NEPA analyses. See, *Improving Health in the United States: The Role of Health Impact Assessment* generally and Appendix F, National Academies Press, 2011.

⁴⁴ 40 C.F.R. § 1508.8(b).

with it.⁴⁵ Although there appears to be no similar study in the context of the public interest community that often engages in the NEPA process, awareness of the concept in that community may be no greater and might be lower. Moreover, awareness of the concept by the public at large is probably low.

Even interpretation of the term *ecosystem services* varies. A broad definition of these services would encompass all aspects of nature that contribute to society's wealth and wellbeing. These aspects include ecological processes, like nutrient cycling and carbon sequestration, as well as tangible things that arise from these processes, like duck populations. They also include benefits like the commercial value of a fishery or human health improvements due to cleaner air as well as activities, like hunting, fishing, and birding, for which environmental amenities provide the context.

Lack of Demand

Lack of demand for ecosystem services valuation by members of the public and public interest groups is one reason for federal agencies' lack of awareness or analysis of ecosystem services. Indeed, some respondents to the Udall Center for Studies in Public Policy survey of people who had worked on NEPA documents in 2011 and 2013 stated that a "requirement" stemming from court cases, for example, would be necessary to compel further attention to these services.⁴⁶

Overwhelmingly, agency personnel implementing NEPA or overseeing its implementation are driven to prioritize their work according to the reality or perception of demands on their time. Those demands may come from their agency's management, the CEQ in its NEPA oversight role, the EPA in its EIS review and rating role, Congress, the public at large or a particular segment of the public, and the courts. None of those "drivers" have demanded or even requested integration of ecosystem services analyses into the NEPA process. Neither the CEQ nor the EPA has issued guidance or direction on this activity. With some notable exceptions, public interest groups have not focused on the subject. And to date, no litigation challenging an agency's compliance with NEPA on the basis of no or inadequate analysis of ecosystem services has been identified.

Lack of Capacity

Even if awareness of and demand for ecosystem services exist, agency personnel must be given the education, training, and tools to analyze those services in the context of a specific proposed agency action, whether that proposed action is a management plan covering millions of acres or a single building complex in a particular type of ecosystem. The information transfer necessary for executive branch agencies to widely implement ecosystem services analysis in appropriate situations has yet to occur.

Relationship of NEPA to Other Statutory Frameworks

NEPA compliance is required for a broad variety of federal programs, plans, and policies. For that purpose, agencies generally prepare a "programmatic EIS" from which analyses for individual program, plan, or policy components may then be "tiered."⁴⁷ Programmatic EISs most frequently apply to plans prepared in compliance with an agency's authorizing statute and regulations. Among the plans that generally trigger the requirement to prepare EISs are U.S. Forest Service forest plans, resource management plans, Department of Defense policy and military installation plans, and Department of the Army civil works plans.

⁴⁵ Carrie K. Presnall, Laura López-Hoffman, and Marc L. Miller, "Incorporating an Ecosystem Services Approach in Environmental Impact Statements," Udall Center for Studies in Public Policy, Environmental Policy Working Papers, University of Arizona, February 2013.

⁴⁶ *Id.* at pp. 11–12.

⁴⁷ 40 C.F.R. § 1508.28.

U.S. Forest Service Forest Plans

The National Forest Management Act of 1976 (NFMA) requires preparation of land and resource management plans for units of the National Forest system.⁴⁸ It also requires revision of these plans when conditions change significantly but at least every 15 years.⁴⁹ In addition, the law requires the Forest Service to develop regulations for forest planning and to specify appropriate compliance with NEPA.⁵⁰

The Forest Service published its latest iteration of final planning regulations in 2012.⁵¹ The regulations define ecosystem services as “benefits people obtain from ecosystems,” including “provisioning services” such as clean air and fresh water, “regulating services,” such as long-term storage of carbon and disease regulation, “supporting services” such as pollination and seed dispersal, and “cultural services” such as aesthetic and spiritual.⁵² The regulations require that plans identify and evaluate “benefits people obtain from the National Forest Service planning area (ecosystem services).”⁵³ Plans must provide “for social, economic, and ecological sustainability within Forest Service authority and consistent with the inherent capability of the plan area. . . .”⁵⁴ They must include standards and guidelines to provide for ecosystem services and multiple uses in the plan area.⁵⁵ Their standards and guidelines to address social and economic sustainability must specifically address ecosystem services.⁵⁶

Various industry and user groups are litigating the regulations, alleging that they are contrary to laws authorizing management and administration of the National Forest system.⁵⁷ The as-yet unsettled lawsuit includes in its claims allegations regarding the requirement to include ecosystem services in forest plans.

An important framework for consideration of ecosystem services is contained in the Forest and Rangeland Renewable Resources Planning Act of 1974.⁵⁸ Specifically, the law directs the Secretary of Agriculture to prepare every 10 years a renewable resource assessment that presents the demand for and supply of renewable resources, an inventory of present and potential renewable resources, and an analysis of the effects of global climate change. Ecosystem services are not referenced specifically in the law, but a cogent discussion of renewable resources might well include assessment of the demands and opportunities for ecosystem services associated with those resources. In fact, the Forest Service is now considering such an assessment, based in part on recommendations from a 2011 report to the president from his Council of Advisors on Science and Technology. That report recommended that the federal government establish a Quadrennial Ecosystem Services Trend Assessment to provide an comprehensive assessment of U.S. ecosystems, to predict trends in ecosystem change, to synthesize research findings on how ecosystem structure and condition are linked to ecosystem functions that contribute important ecosystem services, and to characterize challenges to the sustainability of ecosystem services along with recommended policy responses.⁵⁹

⁴⁸ 16 U.S.C. §§ 1600 – 1687.

⁴⁹ *Id.* at § 1604.

⁵⁰ *Id.*

⁵¹ 36 C.F.R. § 219.

⁵² 36 C.F.R. § 219.19.

⁵³ 36 C.F.R. § 219.6(7).

⁵⁴ 36 C.F.R. § 219.8(a).

⁵⁵ 36 C.F.R. § 219.10(a).

⁵⁶ 36 C.F.R. § 219.8(b) (4).

⁵⁷ *Federal Forest Resource Coalition v. Vilsack*, Civil No. 12-1333 (D.D.C.).

⁵⁸ 16 U.S.C. § 1642 *et seq.*

⁵⁹ President’s Council of Advisors on Science and Technology, “Report to the President—Sustaining Environmental Capital: Protecting Society and the Economy,” July 2011.

Bureau of Land Management Resource Management Plans

The Federal Land Policy and Management Act (FLPMA) governs planning by the Bureau of Land Management (BLM) in the Department of the Interior. The BLM is to manage public lands “in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.”⁶⁰ The BLM must “be managed in a manner which recognizes the Nation’s need for domestic sources of minerals, food, timber, and fiber. . . .”⁶¹

The FLPMA requires BLM to prepare and periodically revise land use plans. The plans must reflect the BLM’s multiple use mandate and, among other requirements, must be prepared with a systematic interdisciplinary approach to “achieve integrated consideration of physical, biological, economic and other sciences”; to “consider the relative scarcity of the values involved”; and to “weigh long-term benefits to the public against short-term benefits.”⁶² When credible analysis can be proffered, these provisions compel consideration of ecosystem services, even though the term *ecosystem services* is specifically referenced by neither the FLPMA nor the BLM’s implementing regulations. Like forest management plans, resource management plans are developed through the NEPA process.

In 2013, the BLM partnered with the U.S. Geological Survey to evaluate the feasibility and value of incorporating ecosystem services valuation tools into the agency’s decision-making process by initiating a pilot project on the San Pedro watershed in southeast Arizona and northern Sonora, Mexico. The project is analyzing four ecosystem services (water, carbon, biodiversity, and cultural values) in three resource management scenarios (urban growth, water augmentation of the San Pedro River, and mesquite management and grasslands restoration). The BLM is also evaluating use of ecosystem services valuation for other regions of the country and resource management issues.

The Secretary of the Interior has a mandate under FLPMA to prepare and maintain “an inventory of all public lands and their resources and other values,” including outdoor recreation and scenic values. The inventory is to be kept current to reflect changes in condition and “to identify new and emerging resource and other values.”⁶³ Like the Forest Service inventory, the BLM inventory might be used in some analysis of ecosystem services on a broad, national scale.

Department of Defense Policy and Military Installation Plans

Since the 1960s, the Department of Defense (DOD) has had programs focused on natural resources conservation and the environment, programs now administered principally through the Office of the Deputy Undersecretary for Installations and the Environment. In 2011, the Under Secretary of Defense for Acquisition, Technology and Logistics issued an instruction that made it Defense Department policy to “demonstrate stewardship of natural resources in its trust by protecting and enhancing those resources for mission support, biodiversity conservation, and maintenance of ecosystem services.”⁶⁴ Under the terms of the instruction, the Deputy Under Secretary of Defense for Installations and Environment is directed to integrate ecosystem services valuation into the DOD Natural Resources Conservation Program. The Department of Defense defines ecosystem services as benefits obtained from ecosystems, including “provisioning services such as food and water; regulating services such as

⁶⁰ 42 U.S.C. § 1691(a) (8).

⁶¹ 42 U.S.C. § 1702(a) (12).

⁶² 43 U.S.C. § 1712.

⁶³ 42 U.S.C. § 1711.

⁶⁴ *Id.* at § 4(a) (2).

flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.”⁶⁵

The Sikes Act requires DOD installations and ranges that contain significant natural resources to prepare an integrated natural resources management plan (INRMP) and to review and revise it as needed every five years.⁶⁶ Thus, other agencies and the public can expect to see analysis of ecosystem services integrated into the INRMP and its revisions as well as into the accompanying required NEPA analysis.

Department of the Army Civil Works Plans

Principles and Requirements for Federal Investments in Water Resources

In the Water Resources Development Act of 2007, Congress directed that the 1983 Principles and Guidelines utilized by the U.S. Army Corps of Engineers, Bureau of Reclamation, Tennessee Valley Authority, and Natural Resources Conservation Service be updated to reflect national priorities, including not only economic development but protection of the environment by maximizing sustainable economic development, avoiding the unwise use of floodplains, minimizing adverse impacts when a floodplain or flood-prone area is used, and protection and restoration of natural system functions. In 2013, the CEQ issued proposed principles and requirements (P&R) and proposed interagency guidelines intended to carry out Congress’s mandate.⁶⁷ Both the draft P&R and interagency guidelines are intended to incorporate ecosystem services valuation into planning processes, including land management planning efforts and NEPA compliance.⁶⁸ The draft P&R state that

The NEPA process should be integrated with the processes developed to implement these Principles and Requirements to facilitate the production of a single decision document that fulfills the requirements of both processes: and the interagency guidance provides more specific direction on integration at both the project and programmatic level. The evaluation framework is to apply an ecosystem services approach ‘to appropriately capture all effects (economic, environmental and social) associated with a potential Federal water resources investment.’ It is characterized as ‘a way to organize all the potential effects of an action (economic, environmental and social) within a framework that explicitly recognizes their interconnected nature.’⁶⁹

This description aptly reflects part of what NEPA analyses are intended to do.⁷⁰

Institute for Water Resources Report

In September 2013, the Institute for Water Resources published “Using Information on Ecosystem Goods and Services in Corps Planning: An Examination of Authorities, Policies, Guidance and

⁶⁵ Department of Defense Instruction Number 4715.03, March 18, 2011, Glossary.

⁶⁶ 16 U.S.C. §§ 560a-670o.

⁶⁷ The drafts of both documents, along with public comments and other relevant material, can be accessed at <http://www.whitehouse.gov/administration/eop/ceq/initiatives/PandG>.

⁶⁸ The P&R add the departments of Agriculture, Interior, and Commerce as well as the EPA and FEMA to the covered agencies.

⁶⁹ P&R, Chapter II, Section 1 A.

⁷⁰ The P&R and the interagency guidelines are still in draft. In the 2012 omnibus appropriations, Congress prohibited the Corps from spending appropriated funds to implement the provisions of the new P&R and directed it to continue relying on the 1983 guidance. In the Consolidated Appropriations Act for 2014, no funds were allocated for P&R implementation.

Practices.”⁷¹ The report discusses the Corps of Engineers’ existing authorities as they relate to ecosystem goods and services, analyzes implementation challenges, and suggests some specific steps that could be taken to efficiently analyze ecosystem services within Corps processes. It identifies the NEPA process as one such vehicle. It also provides a survey of the analysis of ecosystem goods and services by other federal agencies, several states, and the United Kingdom and Australia.

Conclusion

To the extent that economic valuation of environmental impacts of the proposed action and alternatives can be identified and credibly assessed, the ecosystem services valuation analysis is required for compliance with NEPA. The statute clearly anticipated that economic effects of actions affecting the environment would be integrated into NEPA compliance, and CEQ’s guidelines and regulations have always reflected that notion.

What seems “new” about “ecosystem services valuation” (other than the terminology, which is actually not new but has not been widely understood) is the type of economic attributes and evaluations that it tends to embrace. For example, no participant in or observer of NEPA compliance would suggest that an EIS concerning grazing on national grasslands would be complete without an assessment of the economic impact of the proposed alternatives on ranchers who utilize the ecosystem services provided by the grasslands to sustain their way of life. Nor would it be complete without assessment of how the use of grasslands may affect the economics of tourism, either positively or negatively, or how it might affect the value and services of riparian areas. Valuation of ecosystem services can broaden understanding of the synergistic impacts of a proposed action in a way that conforms to the original intent of NEPA.⁷²

Clearly, not every proposed federal action could or should lead to an analysis of ecosystem services valuation within the framework of NEPA compliance. Such analysis will not be relevant to all federal actions in all settings. In most cases, it would make little sense to focus such analysis on small site-specific actions, which often are categorically excluded from documentation in an EA or an EIS under NEPA. However, it may be useful to consider an analysis of the value of ecosystem services in the context of drafting and promulgating a particular categorical exclusion.⁷³ It would also likely be unnecessary to include such analysis in many EAs given their limited requirements, although in certain instances ecosystem services could be an issue that weighs in favor of preparation of an EIS.

The most promising context for a robust and useful analysis of ecosystem services valuation is likely to be in the context of programmatic EISs, whether for land management plans, energy development, or other plans, programs, or policies. Because particular ecosystem services often function meaningfully at a large scale—watersheds or air sheds or estuaries, for example—programmatic EISs can be “tiered” to analysis of ecosystem services valuation for related site-specific projects proposed in the future.

Another benefit of the analysis of ecosystem services valuation in the NEPA context is that it can aid assessment of cumulative effects, which under NEPA are defined as the environmental impact resulting

⁷¹ Reed, Martin, and Cushing, *supra* at fn. 32.

⁷² Letter from Professor Lynton K. Caldwell to Dinah Bear, December 27, 1994, “In my view, environmental impact analysis takes cognizance of social and economic impacts of *environmental effects* . . .” (emphasis in original; available on file at the Nicholas Institute for Environmental Policy Solutions).

⁷³ Categorical exclusions are defined as classes of actions that neither individually nor cumulatively have a significant on the human environment. An ecosystem analysis in this context could be, in certain instances, a valuable part of the administrative record helping to shape the parameters of a particular categorical exclusion.

from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of the actor undertaking the other actions.⁷⁴

In short, analysis of the effects of proposed actions on the value of ecosystem services is appropriate to include in documents prepared pursuant to the National Environmental Policy Act. Such analysis enhances understanding of the services and helps to fulfill both the public policy purposes and the legal requirements of NEPA.

⁷⁴ 40 C.F.R. § 1508.7.

About the National Ecosystem Services Partnership

The National Ecosystem Services Partnership (NESP) engages both public and private individuals and organizations to enhance collaboration within the ecosystem services community and to strengthen coordination of policy and market implementation and research at the national level. The partnership is an initiative of Duke University's Nicholas Institute for Environmental Policy Solutions and was developed with support from the U.S. Environmental Protection Agency and with donations of expertise and time from many public and private institutions. The partnership is led by Lydia Olander, director of the Ecosystem Services Program at the Nicholas Institute, and draws on the expertise of federal agency staff, academics, NGO leaders, and ecosystem services management practitioners.

About the Nicholas Institute for Environmental Policy Solutions

Established in 2005, the Nicholas Institute for Environmental Policy Solutions at Duke University improves environmental policymaking worldwide through objective, fact-based research in the areas of climate change, the economics of limiting carbon pollution, emerging environmental markets, oceans governance and coastal management, and freshwater management. The Nicholas Institute is part of Duke University and its wider community of world-class scholars. This unique resource allows the Nicholas Institute's team of economists, scientists, lawyers, and policy experts not only to deliver timely, credible analyses to a wide variety of decision makers, but also to convene decision makers to reach a shared understanding of this century's most pressing environmental problems.

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