

Charge to the SAB Ecological Processes and Effects Committee for the Consultation on EPA's Ecosystems Services Research Program and Projects

June 29, 2009

Background

In 2008, the Environmental Protection Agency's Office of Research and Development (ORD) prepared a multi-year plan for research on ecosystem services. The resulting program, the Ecosystem Services Research Program (ESRP), is a focused revision of research related to ecosystem services already underway in ORD. The new vision, mission and goal of this plan are defined below:

Vision: Contribute to a comprehensive theory and practice for characterizing, quantifying, and valuing ecosystem services, to ensure that their relationship to human well-being is consistently incorporated into environmental decision making.

Mission: Provide the information and methods needed by decision makers to assess the benefits of ecosystem goods and services to human well-being for inclusion in management alternatives.

Goal: To transform the way decision makers understand and respond to environmental issues by making clear the ways in which our policy and management choices affect the type, quality and magnitude of the goods and services we receive from ecosystems.

The general research questions for the Program are:

- *What are the effects of multiple stressors on ecosystem services, at multiple scales, over time?*
- *What is the impact of changes in these services on human well-being and on the value of these services expressed in both monetary and non-monetary terms?*

To answer these questions the Program is focused on developing quantitative, operational definitions for ecosystem services; knowing how these services are distributed throughout the landscape, and in what quantity and quality; projecting how these services respond to combinations of large and small scale stressors; and determining alternative management options that would optimize their sustainability.

The intent is to inform a wide range of issues related to questions of social choice, with a special focus on informing trade-offs among ecosystem services provided under alternative management and policy decisions. To achieve this objective, the Program has undertaken a multi-dimensional research plan that includes a range of focused investigations as well as integrating, thematic elements. The focused investigations look at the provision of ecosystem services from three different angles: (1) the effect of a

single, ubiquitous pollutant (reactive nitrogen) on service quality and quantity; (2) the dynamics of service flows in two priority ecosystems (wetlands and coral reefs); and (3) the dynamics of service flows in five geographic regions (Midwestern US; Willamette Basin, Oregon; Tampa Bay, Florida; the Coastal Carolinas, and the Southwestern U.S.), that represent a spectrum of ecological and socioeconomic characteristics. The cross-cutting themes include the relationship between ecosystem services and human health; landscape characterization; ecosystem service inventories; alternative management option modeling techniques; and ecosystem service valuation. The ESRP plans to integrate the research outputs from the focused investigations and the thematic work into a decision support platform for use by clients, and to convey research findings through an organized education and outreach effort.

The research will have four general types of outputs:

- ***Measures and dynamic maps of ecosystem services*** – Colloquially known as “maps,” these products reflect the most recent advances in ecological monitoring, spatial analysis, ecological mapping, and cartographic techniques in order to create spatial representations of ecosystem services over multiple scales and time-periods. They will be used for communication, outreach, planning, assessment, and resource management.
- ***Predictive models relating to the response of stressors*** – Models are the foundation of our ability to forecast change and proactively assess how ecosystem functions and services are likely to respond to natural and human stressors. These models reflect a variety of techniques, including statistical, landscape, and process models. Modeling techniques are matched to needs for temporal and spatial scales, the scope of stressors and endpoints to be considered and intended use of model output.
- ***Management Options and Alternative futures*** – The Program develops and evaluates alternative future scenarios relevant to enhancing, conserving and/or restoring ecosystem services. These scenarios are implemented using a suite of modeling tools; results will be presented as maps and other visualization tools.
- ***Decision Support Platform*** – A decision support platform is being developed to enable managers and decision-makers to explore how various policies affect the likely distribution of ecosystem services, and human health and well-being outcomes, both now and in the future. Ideally, the platform will capture user needs for decisions and effectively translate our analytical results in ways that are useful to policies, rules, market incentives, and environmental stewardship.

These outputs provide the ecological information and methods needed by decision makers to assess the benefits of ecosystem services and to identify strategic management options needed to meet the desired outcome for the Ecosystem Services Research Program, which is to secure the integrity and productivity of our ecological systems over space and time.

Overarching Charge to the SAB

In 2008, the ESRP's draft Strategic Multi-Year Plan was reviewed by the SAB Ecological Processes and Effects Committee (EPEC). In turn, the ESRP began revising the Strategy and also began developing detailed Research Implementation Plans. The purpose of the 2009 EPEC consultation is to:

- Assess whether the Committee's recommendations and concerns were appropriately acted upon.
- Review the ongoing work of ESRP for its scientific merit, including its demonstration of disciplinary strength in ecology and its transdisciplinary approach to implementing and integrating the Program.
- Assess the progress the Program has made in 15 months, in light of budget and staffing constraints.
- Offer additional recommendations for meeting the challenges facing the Program as the projects move forward, including identifying measures of success.

Specifically, ORD asks the SAB to respond to the following charge questions.

Specific Charge Questions

Charge Question 1. Current Status and Direction of the Ecosystem Services Research program (ESRP)

- 1.1 The SAB previously reviewed the ESRP's draft Strategic Multi-Year Plan and recommended improvements in the strategic direction and focus of the Program, the research goals and questions, and the program implementation strategy. Given the current status and direction of the ESRP, please comment on whether the Program has been responsive to the intent of the Committee's primary recommendations.
- 1.2 In the SAB advisory report on the EPA Ecological Research Program Multi-Year Plan there was considerable discussion about ESRP's focus on Long-term Goal 1: valuation, human well-being, and decision support. The SAB commented that predicating the whole program on this goal had set the bar too high for success. Has the Program achieved a more balanced focus at this stage of development, or are more adjustments recommended?
- 1.3 Please assess the progress the Program has made in the 15 months since the SAB review of the ESRP's draft Strategic Multi-Year Plan, in light of budget and

staffing constraints. Has sufficient progress been made to warrant maintaining the current elements within the program?

- 1.4 Please comment on the partnership approach being developed in the ESRP. Would the proposed future investments be likely to advance: integration across EPA; adoption of ESRP concepts by the Agency; and the science of ecosystem services, including improved management of ecological risks?

Charge Question 2: Implementation of Integrated Pilot for Reactive Nitrogen

2. Using the nitrogen pilot as an example of ESRP's approach to integration, please comment on how well the ESRP has succeeded in conceptualizing a systems-approach for analysis of ecosystem service impacts. Does the project take appropriate advantage of all the other projects in the ESRP? Have major uncertainties been adequately clarified and addressed to meet Program goals? Are there additional primary gaps or uncertainties that you see as important?

Charge Question 3: Implementation of Mapping, Monitoring, and Modeling Themes

- 3.1 Focusing specifically on the Mapping theme, please comment on the usefulness of the proposed products. For example, please comment on the potential for ecosystem service atlases to communicate the status, changes, and locations of ecosystem services to EPA clients and the public. Similarly, please comment on whether ecosystem service atlases will inform decision makers about: 1) issues related to social equity and social choice; 2) innovative valuation methods (e.g., by providing information on location, availability of substitutes, and changes over baseline conditions); and 3) issues related to environmental and land management, including public and private investments to conserve ecosystem services.
- 3.2 What advice does the Committee have for the next steps in Monitoring and Modeling? In particular, are there pitfalls that the Office of Research and Development should be sensitive to as it develops this part of the ESRP?

Charge Question 4: Implementation of Place-based Studies.

- 4.1 Given the goals of the Program, please comment on whether the conceptual models in the Place-based studies are missing any critical elements.
- 4.2 Please comment on whether, at the current level of development, the Place-based Studies will make good demonstration projects for a variety of decision makers at the local to regional scale. Are there additional ecosystem services that should also be considered in these studies?
- 4.3 Please comment on whether progress in ESRP's Cross-Place-based theme is improving the opportunity to compare and contrast methods and results across the

five sites of the Place-based studies. What recommendations does the committee have for further integration and cross-comparison and testing among these five sites, either now or in the future?

- 4.4 Please comment on whether there are omissions of key partners in any of the place-based studies.

Charge Question 5: Implementation of Ecosystem Specific Studies: Wetlands

5. Please comment on the benefits that can be derived by EPA from the implementation of the wetlands research theme. Have these benefits been made clear? Is the “top down” strategy for designing the wetlands research theme evident and is EPA conducting research that will move the Agency to a national perspective on wetland production functions? Are the proposed analyses missing any stressors that are expected to have a broad impact on the services provided by wetlands?

Charge Question 6: Implementation of Decision Support Activities

- 6.1 Please comment on the defined and anticipated challenges to achieving the goals of the Decision Support Framework. What recommendations does the Committee have to overcome the most significant of these challenges?
- 6.2 How does the EPA reconcile Decision Support as a significant need for the Ecosystem Services Research Program with the Program’s relative inexperience and minimal resources?